#### MACHINE TOOL



OCTOBER 1941



Pray
(RAM TYPE)
UNIVERSAL MILLING MACHINE

Specifications of the FRAY No. 7-B Milling Machine are identical with those of the FRAY No. 7, with which toolmakers the world over are familiar.

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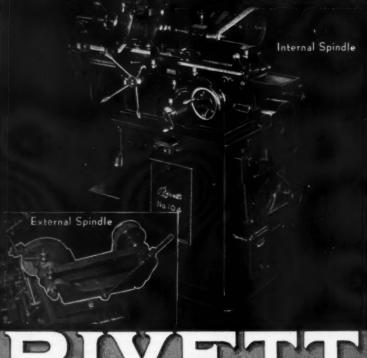
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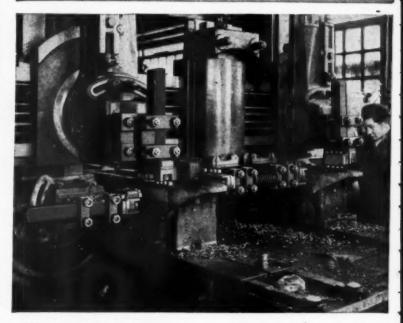


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Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

36,200 This Issue

Volume 37, No. 10

#### OCTOBER 1941

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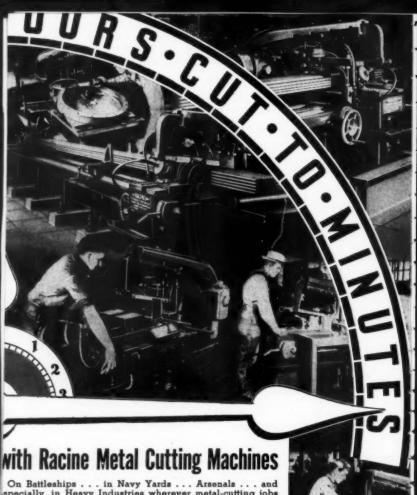
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944	2.2" to 4,260"	10"	344		13	<b>4</b> "	165 lbs.	-
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777	2.6" to 5.343"	14"	High Low 375 220	21/5" per m. 11/5" per m.		200 lbs.	-	
998-18	3.495" to 7.550"	18"	High 234	Lo- 163	High 13/16"	Low 27/32"	275 lbs.	_
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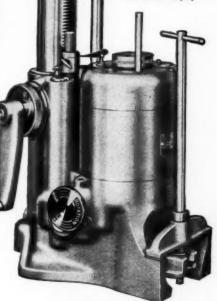


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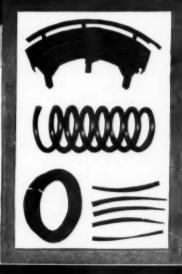
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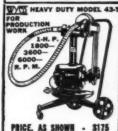
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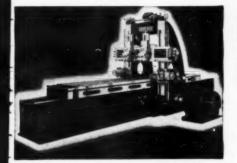


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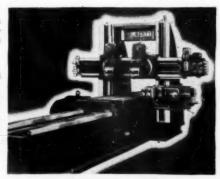
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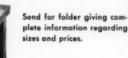


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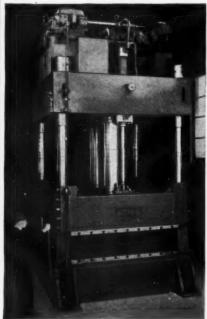
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Stroke Maximum opening, stroke up	60'

Distance between columns, r. to l. 84\* Distance between columns, f. to b. 84\* Platen size, r. to 1. 108\* Platen size, f. to b. 84\*

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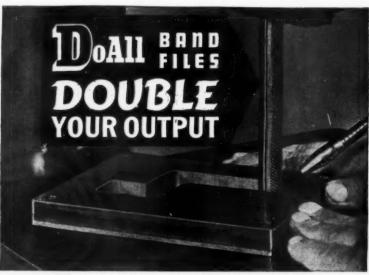






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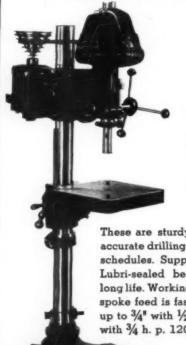


37

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18' swing 5%' spindle travel.

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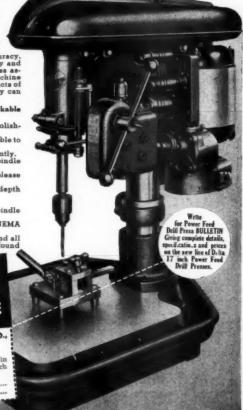
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- 10. . . PLUS low cost, low upkeep and all of the other outstanding features found in Delta drill presses.



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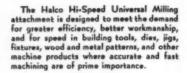
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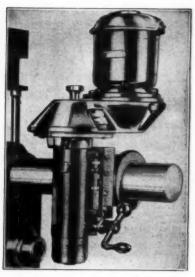
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With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

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With 10 Speed Back Gear \$47.50 Extra

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# Featured In This Issue

DUST DISPOSAL METHODS — A clean atmosphere, free from dust and abrasive particles is essential for comfort and health of workers. Also it makes for better industrial housekeeping in keeping abrasive particles out of bearings, motors and preci-ion machinery. Francis A. Westbrook shows typical examples of modern methods of dust control. See page 57.

AUTOMATIC METER FRAME PRODUCTION gives details of an unusual manufacturing setup developed by the General E'ectric Co., on page 81

MATERIALS HANDLING EQUIP-MENT by George A. Fairman, illustrates and describes new items of equipment for speeding production by facilitating movement. See page.....87

DRILLING HARDENED STEEL by L. G. Black. Chief Engineer. Black Drill Co... Cleve'and. describes the develophent of this startling new method of penetrating hardened parts. Specific

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PLANTS AVAILABLE FOR SUB-CONTRACTS is a continuation of this helpful feature which started in the September issue. Equipment of additional plants is listed on pages 151-2,

WHAT'S NEW marks the start of an extensive section, illustrating and describing some of the latest developments in the machine tool field. See page 155

BLUE BOOK QUIZ—A check-up on your Machine Tool "IQ". See page 270

MECHANICS THROUGH THE AGES

—Blue Book's Monthly picture page, tracing mechanical developments through the years, page 276.



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PLASTIC PARTS ON AIRPLANES lists and describes many of the new plastic parts that are being used in plane construction......page 125

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# SOUTH BEND LATHE WORKS





# Editor's Page

WE have accomplished much in converting our peacetime industrial machine over to defense production.

By and large, government and business are commencing to show a pretty fair job of teamwork—but the performance so far has not measured up to the full needs of the situation.

Whether we are enthusiastic about it or not, this nation has a gigantic rearmament program well under way. There is need for working every production facility at its maximum capacity.

It will mean toil and sacrifice, industrial dislocations and readjustments. More and more will nonessential industries feel the restricting pinch of priorities. So far we've had only a sample.

But, we have this big job to do—and the logical course is patriotic and whole-hearted cooperation. It will be easier and safer for all of us if each does his bit—and does it well.

In spite of the present rush and turmoil though, foresighted industries are giving serious thought to the future.

Eventually there will be a let-down, when the shooting is over, and it will mean a series of painful readjustments.

That's when business survival may hinge on being ready for the market with new products that offer unusual and intriguing sales appeals—new machine tools to do old and new jobs better, faster, more economically and with less effort.

Right now our problem is production. When the emergency passes, there will be a bitter struggle for foreign and domestic markets. This is no time to discontinue or curtail research on products, sales or markets—to overlook the golden opportunity of building prestige and good will by consistent advertising.

Wesley G. Paulson



# Ryerson Certified Steels Help Build Airacobras

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# Cut-Off Wheels in Defense Production

# By R. A. REED

TUBING of all kinds is widely used by the aircraft industry—both in the manufacture of the motors and the planes. It varies from the tiny sizes used for instrument and gauge lines, to the intermediate sizes used for gasoline and oil feed lines, to the large sizes used for exhaust lines, heating lines and the like. It may be made of aluminum, duraluminum, copper, brass or stainless steel.

Some of the cutting may, of course, be done in the tube mill but the greater part is done in the motor or plane plant, or in contract shops, and the abrasive cut-off wheel is in most cases the fastest and most economical method. In fact, it is so speedy that in most plants, even at today's augmented production schedules, each machine is used for cutting a wide variety of tubing—variety both in size and in metal.

In practically all cases, however, the requirements are the same—a straight cut free from burr. Therefore a rubber bonded wheel is most suitable, and it is generally operated dry. The abrasive is fused alumina, except for aluminum tubing, which is usually cut wet with a silicon carbide wheel. Fine wheels give less burr so grain sizes from 80 to 120 are most common.

At the tube mill, and in some of the





largest airplane plants, the cutting is done in such volume that it is really on a production basis—machines operating hour after hour on a single type of tubing. In such cases, the wheel can be fitted very accurately to the special requirements of the individual job

THE ILLUSTRATIONS—(Top) Using a resincid bonded wheel for the cutting of tubing. (Center) Cutting tubing "dry" with a resincid bonded wheel. (Bottom) A wet cutting operation on plastic material using a rubber bonded wheel. These are typical cutting-off operations.

and it is well to have a study made by an abrasive engineer—preferably one connected with a large manufacturer so that he will have all three bonds (resinoid, rubber and shellac) and both abrasives (fused alumina and silicon carbide) at his disposal. Careful se-

lection of abrasive, bond, grain size, grade (bond strength) and structure (grain spacing) will result in a wheel that will give maximum cutting efficiency at minimum cost. The accompanying table gives some of the most common specifications for the production cutting of various types of tubing.

While airplane plants are large users of cut-off wheels, they are by no means the only users in the defense industries. Almost every metal work-



ing plant has countless places for them—in the tool room for salvaging broken taps, drills, reamers, end mills, lathe tools and the like, as well as for cutting stock for new tools, jigs, fixtures, etc.; in the stock room for cutting bars, tubes, angle iron and countless other shapes; in the foundry for cutting gates and risers, especially on non-ferrous castings, and for cutting stock cores to size; on many production jobs

# Types of Abrasives

The abrasives used in cut-off wheels are:—aluminum oxide for cutting steel and most other metals; silicon carbide for cutting non-metallic materials such



as carbon, tile, slate, ceramics, insulating board, etc.

# Types of Bonds

There are three types of organic bonds employed in the manufacture of cut-off wheels: — shellac, rubber and resinoid. Each type of wheel has its advantages and special fields of application.

# Shellac Bond

The shellac bond makes possible a



soft, free cutting wheel which has its definite place in the cutting of tool steels. In the average tool room, a great variety of cutting of metals in the form of bar stock for lathe and planer tools requires cutting without

THE ILLUSTRATIONS—(Top) Cutting pipe with a rubber bonded wheel on a "wet" type machine. (Center) Cutting magnet steel in the plant of a manufacturer of small gasoline engines. (Bottom) Cutting broken drill with shellac bonded wheel preparatory to repointing.

discoloration; broken drills and taps are cut off and repointed. For this work, many shops prefer the smooth cutting shellac wheel, especially when one machine is used for cutting work that varies widely in size and crosssection.



MATERIAL		DRY CUTTING				WET CUTTING			
	Grit	Grade*	Abr.	Bond	Grit	Grade*	Abr.	Bond	
Aluminum					100	U	G.O.	rub.	
Bross	80	V	a.o.	rub.	120	V	G.O.	rub.	
Bronze	46	8	a.o.	res.	60	V	g.o.	rub.	
Cable (conduit)	80		a.o.	res.	60	V	a.o.	rub.	
Copper	46 80 80 60	V	G.O.	rub.	120	V	G.O.	rub.	
Cr.—Mo.	60	X	a.o.	rub.	60	V	g.o.	rub.	
Durgluminum	60	X	g.o.	rub.	80	V	G.O.	rub.	
Fibre	46	K	S.C.	res.					
Glass					90	30	S.C.	rub.	
Low Carbon	46 60 60	X	a.o.	res.	60 80	X	a.o.	rub.	
Shelby	60	X	a.o.	rub.	80	V	a.o.	rub.	
Stainless Steel	60	W	G.O.	rub.	80	V	G.O.	rub.	

\*based on marking system used by most grinding wheel manufacturers.

Abbreviations: a.o. <u>aluminum oxide</u>; s.c. <u>silicon carbide</u>; res. <u>resinoid</u>; rub. <u>rubber</u>.

### Rubber Bond

Rubber bond makes practical the manufacture of wheels as thin as 0.0006", such as used for slitting fountain pen nibs of gold and iridium. Wheels 0.020" to 0.025" in thickness are used for cutting tungsten rod. Rubber bonded cut-off wheels give very satisfactory and economical service on wet cutting-off operations, producing smooth, clean cuts, free from burr and discoloration.

For wet cutting-off, the recommended speed range for rubber bonded wheels is 7,500 to 10,000 s.f.p.m. On dry cutting, they can be safely operated up to 16,000 s.f.p.m. Rubber bonded wheels possess the advantage of costing less than shellac or resinoid, and generally they give less burr.

### Resinoid Bond

With the introduction of resinoid (synthetic resin) bonds and improved abrasive cut-off machines, wheel speeds were increased from 9,000 to 16,000 s.f.p.m. with impressive results as to time per cut and production per wheel. To insure smooth and safe operation at



Cut-off wheels are available in a wide range of sizes, abrasives, bonds, grit sizes, grades (bond strength), structures (grain spacing) and with different types of sides such as special rough sides, etc.

# They help to "KEEP 'EM FLYING"

look into the manufacture or operation of a product is which the first consideration is human safety, and you will see what are tops in shop tools.

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nates drag or text, overcomes chatter, reduce
cloogling, Fest-cutting
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surveth limits. Salf(uncut) signs proteshoulders and the dep
FRE TECHNICAL BUILD
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cutclunded

Here is an example of wet cutting of bar stock with an aluminum oxide, rubber bonded wheel.

such high speeds, resinoid cut-off wheels are precision made and held to extremely close limits for balance, truth, straightness and so forth.

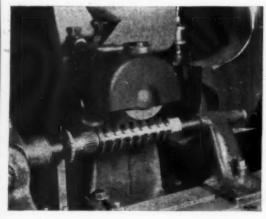
### **Cut-off Machines**

Proper performance of a cut-off wheel depends to a large extent upon the construction and condition of the abrasive cut-off machine. If designed to operate wheels at 16,000 s.f.p.m., it is particularly important that the machine be of rugged construction to

eliminate vibration. In other words, it should have a suitable spindle and be well guarded. Needless to say, the machine should receive the same care in spindle maintenance and lubrication as any precision grinder.

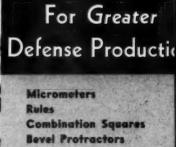
# Basis for Wheel Selection

In order for the wheel manufacturer to specify the correct type, grain and grade of cut-off wheel, complete details of the job, especially as to the type of cut desired, are necessary.



One of the important tool room uses of cut-off wheels is the grinding of chip breakers such as are being applied to this broach.

# DEPENDABLE ACCURACY



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BROWN & SHARPE TOOLS

Satisfactory operation depends almost wholly upon the wheel selected and should be based on:

1. Machine and speed.

2. Material and size of stock.

3. Wet or dry.

 Requirement as to type of cut necessary (discoloration or burring).

### Discoloration

With regard to type of cut, there are two considerations in dry cutting, namely, discoloration and burring.

Discoloration is an indication of excessive heat generated in cutting, and can be eliminated by decreasing the rubbing action with the use of a rough-sided wheel, or by improving the cutting action with a different wheel specification. Discoloration is particularly objectionable when machine operations are to follow the cutting-off, as it is an indication of surface or skin-hardening which in turn affects machinability.

### Burring

Burring cannot be entirely eliminated in dry cutting without sacrificing wheel economy. Finer grit wheels produce a lighter burr, which is readily removed, but generally they have a higher rate of wheel wear than the coarser grit wheels.

### Wet Cutting

Several new types of wet cut-off machines have been placed on the market, and materials which at one time were considered impossible to cut with abrasive wheels, are now being cut successfully by the wet method.

The ordinary wet cut-off machine employs a coolant box which spreads a copious supply of liquid over the work, wheel face and sides and thereby dissipates the heat normally generated in cutting.

Wet cutting promotes long wheel life. The cut itself is of a high quality; any burr which may be produced is light or flaky and easily removed or even washed away in the cutting. Thus,



Rubber bonded wheels are widely used in non-ferrous foundries for cutting gates and risers.

subsequent finishing operations that might ordinarily be required are eliminated. Rubber bonded wheels are usually employed on wet cutting-off operations.

Wet, traverse type machines are particularly adapted for cutting such materials as plate glass, steel slabs, transite plastics, building brick and refractory brick, copper slabs, quartz crystals and other materials of similar characteristics. The wheels are usually rubber bonded, although on some of the materials, resinoid bonded wheels are also being used.

# Submerged Cutting

In this method of wet cutting, the entire work and the lower part of the wheel are submerged in the coolant. The material is kept at a uniform temperature and thus the method lends itself to cutting such materials as glass rods and tubing, plastics, heat sensitive steels, thin-walled copper tubing, etc., where the heat must be held to a minimum. Metallographic specimens cut by the submerged method require only

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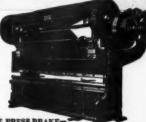
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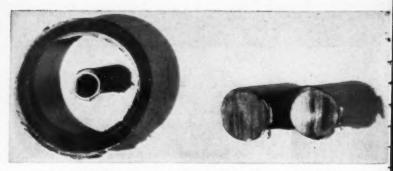


Fig. "A"—Typical cuts made with a wheel which produces a burr but does not discolor the work.

a slight polishing to prepare them for examination. Rubber bonded cut-off wheels are commonly employed.

### Coolants

The coolants commonly used for wet cutting are clear water or a mild soda solution. Commercial grinding compounds in proper concentrations are also suitable. The choice of coolant depends upon the material being cut.

# Types of Cuts

Figure (A) shows representative dry cuts on 1-1/6" machine steel, using an abrasive wheel which does not discolor the stock but does produce a burr. Figure (B) shows dry cuts made with a finer and softer wheel. The resulting burr is so small that it readily drops off. Fewer cuts are obtained from the wheel, however.

Tubing cuts are also shown in these same illustrations. The larger stock is for boiler work and the burr here is not objectionable. The smaller tubing shown is for airplane work and a minimum burr is desired. Thus, it is seen that different specifications of wheels are used, according to the requirements of discoloration, burr, cuts per wheel, etc.

Hard wheels give a fused burr which is rather difficult to remove, but on jobs where there is no restriction on type of cut, such a wheel can be used as a means of increasing production.

Heavier stock requires coarser wheels. The grade of hardness like-wise depends upon the material being cut. To obtain longer life, harder-wheels must be used. Ordinarily, a light burr and minimum discolorationare tolerated.

### Wheel Wear versus Wheel Feed

Wheel wear is dependent upon the rate at which the abrasive grains are dulled and ultimately torn out by the work. When a low rate of wheel feed is employed, the pressure is small. In order that the grains may "bite" and remove the metal as chips, a certain amount of pressure is required.

If this pressure, due to the low rate of wheel feed, is too light, the abrasive grains will rub rather than cut. Excessive heating and softening of the bond follows, causing the wheel to wear rapidly. The rate of wheel feed is, therefore, an important factor in obtaining good production and wheel economy.

Test data positively indicate that as the rate of wheel feed is increased (by increasing the pressure) the wheel wear decreases. This holds true up to the point where the grains tend to dig in too deeply and are broken out



The main beam on the tester is controlled by the use of a dash pot which also has an adjustment to either increase or decrease the speed.

Every tester is checked and tested for accuracy in direct readings on various standard scales—C, A, D, B, E, F and G scales. Black numerals on dial give direct readings when diamond penetrator is used; Red numerals give direct readings when the 1/16 or 1/8 ball is used. Conversion Readings can be made on the tester.

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by the increased resistance offered by the greater cross-section of the chips. Then the rate of wheel wear becomes higher.

The proper rate of feed for efficient operation can only be determined by the individual operator. This rate will also vary with the material being cut.

# Low and High Speeds

"Low speed" in cutting-off work implies that the wheels are operated at 9,000 to 12,000 s.f.p.m. or less, whereas "high speed" is generally 15,000 to 16,000 s.f.p.m. To obtain a peripheral speed of 16,000 f.p.m., the following spindle speeds should be provided:

12" diameter 5092 r.p.m. 14" diameter 4366 r.p.m. 16" diameter 3820 r.p.m.

The minimum thickness of resinoid cut-off wheels for safe operation at "high speed" varies, as follows, according to the diameter:

12" diameter 3/32" thickness
14" diameter 3/32" thickness
16" diameter 4/6" thickness
18" diameter 4/6" thickness

The minimum thickness of rubber cut-off wheels for safe operation at "high speed" varies, as follows, according to the diameter:

12" diameter h" thickness 14" diameter %" thickness

16" diameter 1/4" thickness 18" diameter 1/4" thickness

"Low speed" cut-off wheels, both resinoid and rubber bonded, can be made to any thickness desired, within the limits of manufacture as determined by the grain size and diameter.

# Types of Cut-off Machines

Abrasive cut-off machines may be classified as:

- 1. Portable machines.
- 2. Low speed machines.
- 3. High speed machines.

# Portable Machines

This group of machines uses wheels 6" to 12" diameter. The wheel speed is generally 7,500 to 10,000 s.f.p.m. Portable cut-off machines are used by stoneyards, quarries, building contractors and tile workers. They are replacing the much slower and more expensive method of hand chipping. In small metal working shops, portable cut-off machines are often mounted on a work bench and employed for cutting light bar stock and tubing.

# Low-Speed Cut-off Machines

Most of the abrasive cut-off machines in use—from the specially designed machines for production cutting to the makeshift equipment found in small shops—are of the low speed type. The

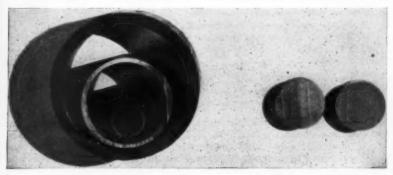


Fig. "B"—Using a finer and softer wheel, the burr becomes so small that it drops off, but wheel efficiency is lower.

# HARDEN

# MOLY

HIGH SPEED STEELS AS EASILY AS

18-4-1

# ELECTROTHERMIC-PERMEATION

IGH-SPEED Tool Steels of half Molybdenum, half Tungsten or even all Moly are now being hardened with absolute certainty of uniform results. The Upton Electrothermic-Permeation principle of operation has made the changeover from 18-4-1 types surprisingly easy and there is very little experimenting to determine proper temperatures and time. Once determined, results can be duplicated with absolute certainty.

Users of Upton Electric Salt Bath Furnaces have found that:

1 There is no decarburization even on ALL-MOLY alloys and size change of tools during hardening is under perfect control. This means that thousands of Moly hobs hardened in Upton furnaces—are being sold without any grinding after hardening. 2 Properly hardened Moly H. S. Steel tools will give identical cutting characteristics with 18-4-1.

3 The ceramic pots last longer and the furnace costs considerably less to operate.

The Electrothermic-Permeation principle of operation assures a positive, yet natural, circulation of heated salt. Fuel savings are upwards of \$1200 per year. Reorders of Upton furnaces have increased sharply since users have begun hardening the MOLY types of high speed steels.

Let us tell you more about these furnaces now.



UPTON ELECTRIC SALT BATH FURNACE DIV.

wheel speed is usually from 9,000 to 10,000 s.f.p.m. Wet cutting is done on low speed type machines.

# High Speed Cut-off Machines

This type of abrasive cut-off machine is generally used on high production jobs where discoloration and burr are not objectionable, as on small bar stock, tubing, pipe, angle iron and so forth. It combines the advantages of fast cutting and long wheel life.



Using a portable machine to cut Transite and similar materials.

Resinoid bonded wheels are generally used on high speed cut-off machines. However, where minimum burr is a factor, rubber wheels may be used, although it must be expected that they will not give as many cuts per wheel, when used dry, as will resinoid wheels.

The high speed abrasive cut-off machine must of necessity be properly designed, inasmuch as the wheel requirements for safe operation at 16,000 s.f.p.m are much more exacting than at lower speeds. The wheel strength is great radially but weak laterally. Therefore, the machine must be kept in the best of condition. No side play must be present in the spindle bearings. The

work should be held securely on both saides of the wheel.

Wheel balance, thickness variation, warpage or dishing must all be controlled within narrow limits. A warped wheel causes vibration, which at high speed is both objectionable and hazardous. The resultant run-out means greater side pressure and this in turn may cause breakage. Even though breakage does not occur, the pressure causes the grains on the sides of the wheel to become dull and excessive heat is then generated by the rubbing action.

A number of specially designed high speed machines on the market incorporate the essential features for safe and satisfactory operation. Changing over low speed equipment to high speed is not advisable, unless serious consideration is given every factor involved by the vastly greater stresses, and necessary provision must be made for safe operation.

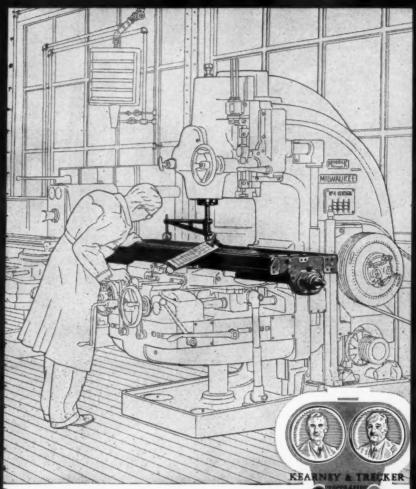
# Diamond Cut-off Wheels

Cut-off wheels containing crushed diamond particles as the abrasive are available for cutting the cemented carbides. They have also been used for cutting fused quartz with some measure of success. These wheels vary from 3 to 8" diameter, can be had as thin as .020" thick in 3" diameter and are usually made with a depth of diamond in the periphery of ½". The wheels must be used wet, with either clear water or a soda solution as a coolant.

# Selection of Resinoid and Rubber Bonded Cut-off Whee's

Specify Resinoid Bond For dry cutting (9,000 to 16,000 s.f.p.m.)

- Where some burn is not objectionable.
- Where burr is not objectionable.
- Where area of cross-section to be cut is relatively large.





Milwaukee MILLING MACHINES

Specify Rubber Bond

For wet cutting (7,500 to 10,000 s.f.p.m.)

For submerged cutting (5,000 to 6,000 s.f.p.m.)

1. Where cuts must be smooth, clean and free from burrs. For dry cutting (9,000 to 16,000

s.f.p.m.)

- 1. Where area of contact is relatively small.
- 2. Where excessive heat is not generated.
- 3. Where burrs must be held to a minimum.
- 4. Where extremely thin wheels are required.

In general, to obtain maximum wheel life, use the coarsest grit and the hardest grade which the job will allow.

# Resinoid Bonded Cut-off Wheels

The standard resinoid bonded cut-off wheels listed in the accompanying table are recommended and should be tried first for "high speed" cutting.



Cutting off a chipped cemented carbide tipped tool with a diamond cut-off wheel. The steel shank has been cut previously with a resinoid

# Effect of Changing Wheel Specifications

Resinoid Bonded Cut-off Wheels

46-O AL. OX.

Drills Steel, High Carbon Stellite

24-5 AL. OX.

Allegheny Metal Aluminum Drill Bits Steel Cable Chrome-Nickel Steels Steel, High Carbon (annealed)
Steel, Low Carbon
Steel, Cold Rolled

30-W AL. OX.

Brass Rod Brass Tubing Bronzes Boiler Tubing Nickel Nickel-Silver Steel Pipe Steel, Small Stock Valves (automobile)

1. The coarser the grit size, the harder acting the wheel.

2. As the grade letter increases

1. The coarser the grit size, the

2. As the grade letter is increased

harder the action of the wheel.

from K to X, the wheel also

comes harder acting.

Rubber Bonded Cut-off Wheels

from K to X, the wheel be-

# Rubber Bonded Cut-off Wheels

Owing to the particular suitability of rubber bonded wheels for wet cuttingoff operations, the standard specifications below are recommended and should be tried first for cutting the various materials listed.

### 80-V AL. OX.

Steel, Cold Rolled (large diameter) Steel, High Speed Steel, Tool Steel, Tungsten

### 60-X AL. OX.

Brass Tubing Brass Rod Steel, Cold Rolled (small diameter)
Steel, Stainless
Steel Tubing

becomes harder acting. (Photos-Courtesy Norton Co., Worcester, Mass.)

# Industrial Uses

ONE OF A SERIES S. S. WHITE POWER DRIVE AND REMOTE CONTROL ELEVIDIE CHAETC



# REMOTE CONTROL

As indicated by the typical applications listed below, the use of S. S. WHITE Remote Control Flexible Shafts is extensive and steadily growing. These shafts, specially engineered and built for remote control, have the properties essential to smooth, sensitive operation under varying conditions of length and curvature.

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# TYPICAL REMOTE CONTROL APPLICATIONS.

IN AIRCRAFT—for remote control of Radio Receivers, Transmitters and Direction Finding Equipment—Antenna and Compass Loops—Antenna Reels—Gyro Pilots—Heating Registers—Tabs—Turn Bank Indicators—Variable Pitch Propellers—etc., etc.

IN AUTOMOBILES—for remote control of panel and underseat Radios—Telescoping Antennas—Choke and Needle Valve— Engine Governor—Search Light—Steering column mounted Gear Shifts—Retractible Head Lights—Crank Case Drain—Clock setting—Trip Mileage Reset—etc., etc.

GENERAL—Centralizing machine adjustments and controls— Remote operation of switches, valves and inaccessibly located electrical and mechanical elements—Manual or automatic operation of indicating devices such as cam position and valve position indicators—Gun Fire Controls—Oven Thermostat Controls—etc., etc.

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# **Dust Disposal Methods**

# By FRANCIS A. WESTBROOK, M. E.

THE collection and removal of dust and small chips from milling, boring, grinding, polishing and buffing operations carried on in almost all metal working shops is becoming increasingly important, especially since the defense program involves such a great increase in precision work with highly developed machine tools in so many important machine shops. By proper control and removal of dust workers' health is protected. Bearings of all exposed machinery and motors are also protected and plant cleanliness is greatly furthered. A few examples taken from actual experience will show what can be accomplished, and how.

A recent installation in the new addition to the Cincinnati Bickford Tool Co., Cincinnati, is shown in Fig. 1. This section is used for sanding, rough grinding, filling and painting castings. Such operations formerly stirred up considerable dust and dirt. With the new dust removal equipment, this department enjoys an atmosphere entirely free from dust particles and paint fumes.

The downdraft system carries off the dust and sand particles as fast as they are released from the castings in the grinding and sanding operations. The castings are placed over grills, as shown in Fig. 2, through which the air is suctioned. As this air is carried into subterranean ducts, it is replaced with fresh air from the intakes. The system is capable of drawing off 75,000



Fig. 1—Surface grills and underground dust passages maintain a clean atmosphere in this busy shop.



Fig. 2-Castings are ground on arills and the abrasive dust whisked away to the Roto - Clone System which filters out the solid particles from the air.

cubic feet of air a minute, while the intakes are adjusted to supply 80,000 cubic feet a minute.

Temperature of the incoming air is adjusted to the desired degree by thermostatic valve and by-pass control arrangement. A complete change of air can be made every 7 minutes.

Fine dust and particles from the castings disappear almost instantly into the grills and there is no perceptible dust in the atmosphere at any time.

# **Eliminating Paint Fumes**

In the paint department, housed in the same section, much of the work isdone in front of a water wash spray booth. A continuous waterfall drops behind the object being sprayed and carries off the excess paint. Other painting is done over floor grills similar to those used for the grinding work. The excess paint is suctioned off, then wached out of the air by a flowing curtain of water, and the clean air is discharged.

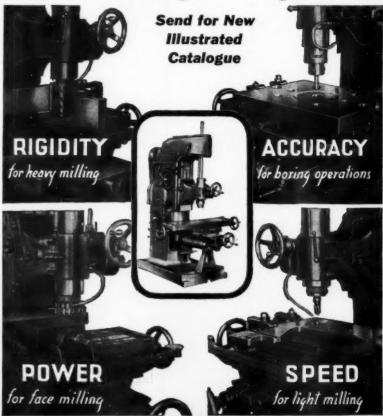
Downdraft units also carry off dust particles and the smaller filings from the minor bench operations. Each vise is provided with a suction unit.

Equipment of the plant is correlated with the air-purifying devices so that



Fig. 3—Glimpse into the Monarch Machine Tool plant showing grinding bucks in foreground, with sheet metal guards to catch flying particles.

# 4 BIG FEATURES of the Knight Milling Machine



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operations are facilitated. In installations of this type, space above the work positions is free for the use of cranes. As a result, manual lifting operations are reduced to a minimum.

For lighter work in the painting department, a system of conveyors and

transfer tables is installed.

### Grinding Alongside Precision Machining

Fig. 3 shows another example of the modern trend in downdraft dust disposal as installed at the Monarch Machine Tool Co., Sidney, Ohio. Here, the downdraft system makes it possible to grind and sand castings within a few feet of precision machining operations, without any partitions, walls, curtains or anything of the kind.

There are 14 working stations—11 for small castings, 3 for lathe beds and other large castings. The top of each unit is a large grating, through which air is exhausted to pull away the mist of sand, rust and other fine particles.

With the gratings for the large castings located on the floor, and those for the small castings at 16", 20" or 32" levels, the men are never in position to inhale dust or fumes, nor do

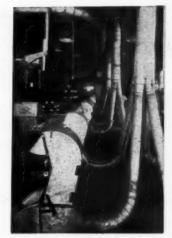


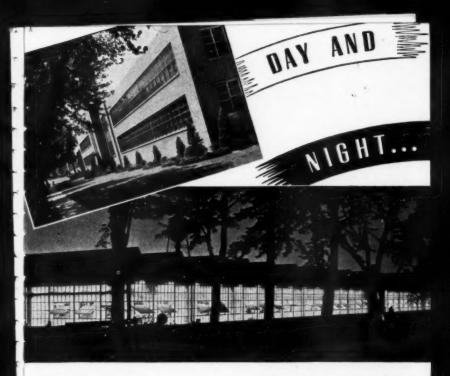
Fig. 4—Another type of installation with multiple suction pipes.

they have to work in uncomfortable positions.

Units in the grinding section include



Fig. 5—A busy grinding and polishing line with outlets connected to a suction header.



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# MONARCH LATHES

Tool Company, Sidney, Ohio.

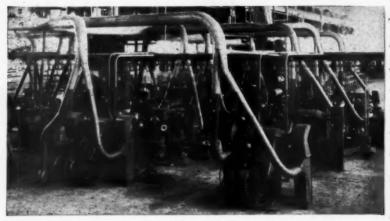


Fig. 6—A Canadian installation which removes foreign matter and conserves heat.

a 2-wheel snagging grinder, a surface grinder for castings up to 4-ft. square and 4 grinding bucks, the largest 4-ft. In order to catch the in diameter. flying particles in the bucks, these units are protected by sheet metal guards as shown.

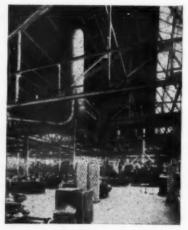


Fig. 7-A system which is com-plicated because it serves many

Two 4' x 8' grilles are provided in the paint department. Spray paint particles pulled down these grilles are carried away by means of water solution and eliminator packs located underground.

Four grilles, each 52 ft. square are provided in the sanding department. Here water vapor is employed in connection with the blower fan to eliminate the sand particles in the form of sludge.

### Saves Lifting

To facilitate handling of the large castings, the three floor stations are connected by means of a 54" track. Riding on a dolly, the heavy castings are moved from the receiving department through the grinding, painting and sanding operations to the machining department, without further lifting.

All units are exhausted through the roof. The two painting outlets are carried 30 ft. into the air to prevent fumes re-entering the plant through monitor windows. amount of air removed is 50,000 cu. ft. per minute at an average surface velocity of 20 ft. per minute.

Other methods of collecting dust from rows of grinding machines are shown in Figs. 4 and 5. In other words, considerable variation is possible to per-

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Packless

mit of meeting local conditions in different plants. The long radius elbows and streamlined junction fittings are also in evidence here, indicating good practice in this type of installation.

Fig. 6 shows the dust collecting system at the plant of the Canadian Motor Lamp Co., Windsor, Ontario. In this instance, the air flow is provided by means of two fans which discharge into one centrifugal type dust collector. In this, the heavier dust, lint and tripoli are removed from the air, which next is passed through a cloth screen arrester to remove the light dust. The air is then returned in order to avoid waste of heat which is an important factor in the Canadian winter climate.

### Individual Exhausts

In addition to collecting dust from polishing and grinding, the Chrysler Corp., at its transmission plant at Kokomo, Ind., has nine dust collecting systems for the removal of dust from milling, boring and grinding operations. Each system has its separate cyclone on the roof. There is a small storage bin under each cyclone separator into which the dust and chips drop. Each bin is equipped with cut-off gates and canvas connections whereby the material may be drawn off into factory trucks for disposal.



Fig. 8—An effective installation of still another type.

In Fig. 7 is shown the dust collecting system for metal dust and small chips in the parts manufacturing division of one of the plants of the Ford Motor Co. This is a complicated system, due



Fig. 9—An unusual installation of 149 spindle lathes with downdraft dust disposal hoods. Fig. 10 shows part of the suction pipe arrangement below the floor.



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to the large number of units served, calling for secondary branch lines which join main lines rising to dust arresters and fans on the roof. With such a complicated arrangement it is very important to have the long radius bends and streamlined junction fittings.

An excellent example of the advantages of an effective dust collecting system, and what it means, is to be found in the plant of The Maytag Co., Newton, Iowa. Some 500,000 aluminum castings are polished in this plant every month on 120 polishing lathes and 40 belt grinders. About two tons of dust are collected from this machinery in nine hours. Before the dust collecting system was installed, it took five men 11 hours every night to clean this department, whereas under present conditions, only the ordinary routine housecleaning is necessary. In addition, a clean shop has resulted in an increase in production of about 20%. Reduced repairs and maintenance of bearings, machines and motors due to the elimination of dust will, furthermore, pay for the cost of the installation in a comparatively short time.

cause of the difficulties involved, such shops were slow in adopting dust collection. However the difficulties have been overcome by the use of small, heavy hoods, flexible connections, telescopic joints, rods, and thumb nuts, by means of which the hoods can be held in any desired position without interfering with the operators for practically any kind of work.

Fig. 9 shows how 149 spindle lathes have been equipped with dust removal equipment at the Trico Products Corp., plant, Buffalo, N. Y. This is in the windshield wiper production buffing department. The suction for this large scale system is provided by means of seven fans having a total capacity of 225,000 cu. ft. per min. As the illustration shows, the room is very clean. In this case, the dust is drawn downwards into main collectors below the floor, and it is to be noted how pipes join without any sharp angles which would make for undue air friction in them. Such an arrangement also leaves the floor free for trucking and other movement of materials and operators. The manner in which the piping is in-



Fig. 10—Arrangement of suction pipes underneath the floor for the installation of 149 spindle polishing and grinding lathes shown in Fig. 9 on preceding page.

The Packard Motor Co. has installed a dust collecting system in its tool grinding department which has proved to be very ratisfactory. A part of it is shown in Fig. 8. This kind of an application is tricky because of the large variety of set-ups called for, and bestalled below the floor is shown in Fig. 9, from which will be seen how the individual pipes enter the main in such a manner that the dust continues through them in the direction of air flow. The avoidance of too sharp bends is also evident here.

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Many other examples are available but enough have been given to show what is being done to dispose of dust and small chips in machine shops in almost every field of industrial activ-Some consideration of this discussion will also show that a rather specialized kind of engineering is called for in order to make a fully successful installation. This, of course, is due to the fact that conditions as to lavout of machinery, shape of space involved and the nature of the dust to be removed all call for special han-The curvature of bends and dling. streamlining of junction fittings must conform to existing conditions and these, as well as other matters, determine the necessary diameters of piping and the number, size and location of blowers. Consequently it is highly desirable to enlist the services of reliable manufacturers of such equipment and then to follow their recommendations.

(Illustrations—Courtesy Kirk & Blum Mfg. Co., Cincinnati, O., and American Air Filter Co., Inc., Louisville, Ky.)

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## Stepping-Up Production with Standard Carbides

A HEAVY increase in production between tool regrinds through the adoption of standard forms of tungsten carbide tools is reported by the Consolidated Brass Co., Detroit, in the manufacture of cast brass pipe fittings, gas cocks, steam fittings, water gages, oil and grease cups and other products. Production runs formerly around 200 pieces, now often reach 20,000 or more and regularly, as many as 5,000 pieces are produced before tool regrinding is necessary.

These impressive increases in production are due to a combination of two factors—the adoption of standard Carboloy tool bits and the development of new types of tool holders in which the bits are mounted. In addition, the new holders make it possible for each holder to perform several operations for which two or more tools or holders were formerly needed.

A rather unusual use for carbide tools has also been developed in connection with drilling operations. For such purposes low cost Carboloy "Masonry" drills are used. The drills are built into the holders along with up to six standard tool bits and are used for drilling cored holes at the same time the exterior sections of certain fittings are turned or faced. The holders are mounted in standard turret lathes and in a sequence of simple cuts are able to finish all the desired sur-

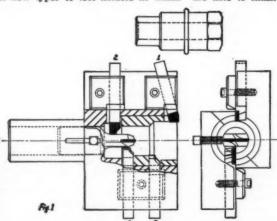


Fig. 1—Special tool holder for producing water boiler fittings, using four % " square style No. 1 standard tool bits and a 1" masonry drill.

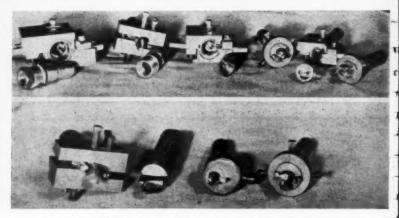


Fig. 2—(Upper) Holders for producing four different kinds of fittings as shown in front of holders. Fig. 3—(Lower) Old and new types of holders contrasted.

faces, ready for threading, when required. Formerly the cored holes were bored with flat bits mounted in short pieces of round bar stock with shanks to fit into the turret head, a separate preliminary operation prior to further finishing of the exterior surfaces.

A feature of the holders is that once the bits have been properly formed from the standard tools and set in the correct position in the holders, they need only be mounted in the lathe turret. All operations are performed by the tools mounted in the holders, no cross-carriage tools being required for finishing the external surface even though in some cases the length of cut on the external surface is several inches. Some of the fittings are quite complicated in form with internal valve seats, chamfers, etc.

The principle on which the holders and tools are built is shown in the drawing of a special holder for producing water boiler fittings (Fig. 1). The same holder is used to machine both long and short sizes in straight and offset types, the drawing illustrating the setup for the short type. With this holder, Tool No. 1 turns the large diameter and faces the flange. Tool No. 3 turns the small diameter and chamfers the end of the large diameter. Tool No. 4 similarly chamfers and faces the end of the small diameter. The masonry drill centers the cored hole.

For the long fittings, on which only the small diameter is longer than for the short fittings, Tool No. 4 is withdrawn from position. The masonry drill is also drawn back, utilizing the slot provided in the tool holder. This permits Tool No. 2 to face and chamfer the small end of the part, and the drill to form the center as for the short fittings. Another holder is used to face and chamfer the large end and a specially ground standard masonry drill finish bores the hole. This holder utilizes four 3/8" square style No. 1 standard tool bits and a 1" masonry drill. The various shapes of the ends of the tool bits shown in the drawing are obtained by grinding the square ends of the standard tools as desired.

In Figure 2 holders are shown as

## Three problems in one plant ... I licked them all with AIR and HIGH-CYCLE







High-cycle power. The Reter 6" Grind



High-cycle pewer. The Refer 14" 467-D Drill.

Situation No. 1. A tough buffing job, calling for heavy pressure on wheel. Plenty of air available. Recommended Air tools-Rotor D-100 "Powerplus" Buffers.

Later-Situation No. 2. Defense orders required expansion of another department, with 12 tools-die grinders, straight grinders, and vertical grinders. Air compressor to run 12 tools only would cost \$2497. High-Cycle generator set of twice the capacity—that is to run ultimately 24 tools would cost \$1301 complete and could be delivered quicker. 12 Rotor High-Cycle tools were installed right away.

Later-Situation No. 3. Wanted 14" drills for work next to office. Quiet operation required. Suggested running a high-cycle line to this location from their generator set. So this is a quiet-High-Cycle job for Rotor 467-D Drills.

How about YOUR problems? With Air and High-Cycle, I can supply answers which fit your portable tool problems like a glove. See how this unbiased service and Rotor Tools can speed up your production and cut your costs!

THE ROTOR ANALYST

The Rotor Analyst has 65 different Air tools and 59 different High-Cycle tools with which to solve your problems.

used for producing four different kinds of fittings. The holder at left is the same as shown in Fig. 1. The holder shown second from left is used for drilling, facing and chamfering both the inside and outside diameters for the part shown in front of it. The next holder cuts on four surfaces simultaneously, including turning and chamfering both the inside and outside diameters and chamfering the face, ready for the next operation. The three holders at the right completely finish the fitting shown except for threading. The tool in the center of this group turns the small ends to 1/4" pipe size. left tool rough bores the inside diameter, then faces, chamfers and counterbores the I.D. ready for tapping. The right tool drills and bores the I.D. of the other end of the piece, ready for tapping. The three tools shown at the right have already produced more than 5000 pieces and are ready for further production without regrinding.

The variety of special form tools necessary to produce all types and sizes of fittings made by the Consolidated Brass Company is almost endless. The number of such tool holders is in the neigh-

borhood of four thousand, of which most still utilize carbon or high-speed steel cutters. However, whenever one of these becomes too worn for furthers use, it is replaced by one of the new types of holders employing Carboloy bits and masonry drills. Dozens of these new tool holders have been made since the decision to utilize them was made a few months ago.

The performance of the masonry drills is considered remarkable by production men of the company and it is in the use of these drills that greatest increase in production between grinds has been obtained. Formerly only from 50 to 150 pieces could be produced before regrinding for sizes in the neighborhood of 1 inch. The masonry drills are able to cut the hard surface of the cored holes without measurable wear. Runs to date on fittings have exceeded 20,000 without regrinding. In fact it is stated that apparently they will never need it.

Figure 3 contrasts the old with the new type of holders. Holder at left not only replaces the one shown next to it, but also includes two bits for chamfering and facing. The pair of tools

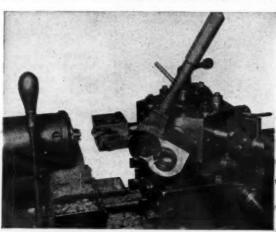


Fig. 4—Two of the new type holders mounted in turret lathe.

# Introducing The CLEVELAND

Designed to meet the steadily growing demand. This small, rigid, high-speed vertical spindle Milling Machine embodies all essential features required by the modern tool room, die and mold shop, and production plants. In addition, the new CLEVELAND is equally adaptable to heavy duty continuous production. It is a completely new maVERTIC

AL

MILLING MACHINE

chine, designed and built with all these requirements in mind, by a company whose principle business for 20 years has been creating special machines for the high production industries.

Longitudinal feed is 18"; cross travel, 81/2" and vertical travel, 16". The table has a working surface 8" by 32". Two optional ranges of 12 spindle speeds each are offered, from 100 to 1750 r. p. m. or 200 to 3600 r. p. m.

For further information

write for new Bulletin

THE SOMMER AND ADAMS CO. CLEVELAND, O.



at right contrasts the use of an ordinary drill combined with a facing cutter, the new tool combining a masonry drill with two bits for facing and cham-quering.

Figure 4 shows two of the new holders mounted in the lathe turret. The one in position is the same tool as shown in Figure 2 (third from left). The other, at right in the turret, is equipped with a carbide tipped cutter for finishing the inside diameter and facing a valve seat to close tolerances with the outside face of the part. The tool with long handle undercuts the part for threading.

For most of the holders standard tool bits in 5/16" and \( \frac{3}{6}\)" sizes are used. Masonry drills in 7/16, \( \frac{3}{6}\), 15/16 and 1" sizes are most often built into the holders. When the masonry drills are combined with tipped bits in the holders, every part of the entire tool is equally able to produce fittings without regrinding and resetting to correct position.

### YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

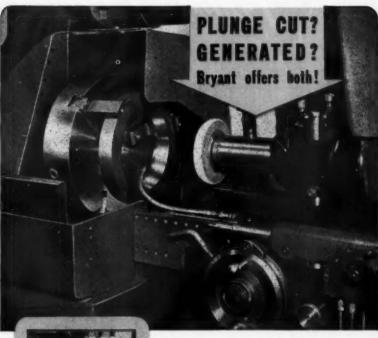
Offered in two sizes.

Vine No.	Width of Jaw, Inches	Opens	Weight Pounds
1D 2D	31/2	31/2 51/2	121/2

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE. PENNSYLVANIA



THE Bryant principle of overhead wheel slide suspension lends itself to the easy, profitable grinding of dies and similar parts.

A guide is used for controlling the wheel slide traverse to follow the work contour or for controlling the shape of the wheel if the plunge cut method of grinding is preferred.

The first, or generating, method has been favored by many manufacturers of dies due to assurance of smooth blended curves and freedom from rings left by the abrasives.

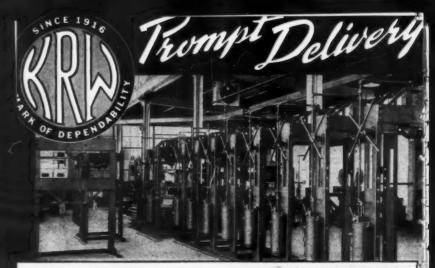
The plunge cut method is much the faster method due to the larger area of contact of the grinding wheel.

Which method will best suit your requirements? Our engineers and field men will gladly help in solving your problems.

BRYANT CHUCKING GRINDER CO.



No. 16-22' Burnt Internal Grinds



## LIC ARBOR





To keep abreast of the increased demand for KRW Hydraulic Arbor Presses it has been necessary to expand the erection department. As shown in the illustrations one whole section of the KRW Arcade Plant is devoted entirely to assembling and erecting KRW Presses. Delivery on any size can be made in 1 week to 10 days. KRW Hydraulic Arbor Presses meet today's demand for SPEED. Every feature of design and construction contributes to this essential industrial requirement. KRW Presses incorporate MANY important advantages not available in other presses at any price.

## K. R. WILSON

PORT OFFICE: 90 WEST STREET, NEW YORK, N.Y., U.S. A. ST COAST: 722 MATEO ST., LOS ANGELES, CAL., U.S. A

### MAIL THIS COUPON

K.R. Wilson, 27 Lock St., Buffalo, N.Y. Please send Hydraulic Arbor Press Bulletin No. 27.

Name . Address

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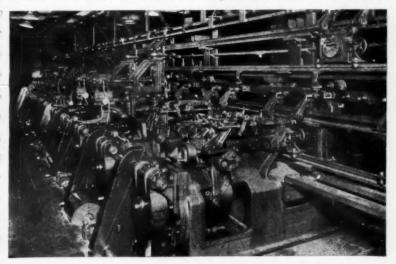
State ...

## **Automatic Meter Frame Production**

A N automatic, "straight-line," multiple-station machine at General Electric's West Lynn Works performs 77 machining operations required on the cast-iron frames for the Company's Type I-30 watthour meter with the part held in one position in the locating jig. Drills, counterbores, and taps in the unit operate from five directions, and milling is done from two opposite sides.

The equipment consists of 11 in-line machining stations facing a two-level transfer mechanism. The mechanism moves a series of rail - mounted jigs from the loading station into position in front of each machining station. When a jig passes the eleventh station at the end of the automatic unit, it is raised to a pair of upper level rails and returned to the loading end by means of a roller chain. There it is returned to the lower level, where an operator removes the finished part and reloads with a rough casting.

The 11 machining stations are spaced at four-foot intervals along the 65-footlong transfer mechanism. Each machin-



Rear view at first station showing line-up of the 11 machining stations, spaced at 4-it. intervals along the 65-ft. transfer mechanism.

ing cycle is 15 seconds, after which the jigs, supported by the lower rails, are moved to the next station in line. Drive of the cutting tools is mechanical, but the transfers are hydraulic because they are intermittent and at comparatively high speed. Synchronized movement of the cutting tools and the hydraulic transfers is obtained by a master control station which operates limit switches controlling solenoid valves.

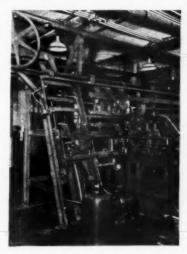
Only one operator is required to load and unload the jigs. Another man reg-



Operator at loading station replacing machined frame with rough casting.

ularly assigned to the machine attends to tool adjustment and replacement and is responsible to the inspector for continuity of operation of the machine and the finished frames.

It is emphasized that the straightline machine is capable of a uniform accuracy not possible with conventional methods. Previous practice called for securing the cast-iron meter frame in a jig and performing all operations possible in a rotary indexing-type machine, locating from points upon the rough casting. Other similar machines were then needed to complete all the



Hydraulic lift and jig-transfer mechanism at last station.

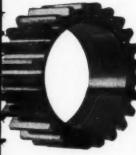
operations, locating upon the previously created surfaces. In this process, when the product of the first series



Inspector using a multiple indicator gage to check simultaneously, all critical dimensions of a meter frame.

# FLAME

Licks the Tough Ones



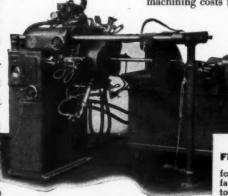
For further details on the automatic features and flexible application of this new machine, write for "Flame

Hardener Bulletin."

## THIN SECTIONS no longer a problem

By former methods, the hole in this sleeve gear would have to be reground after hardening, and the teeth remachined to remove distortion. By Fellows Flame Hardening, the teeth are only hardened to the roots, and neither the teeth nor the thinwall section are distorted . . . Flame Hardening pays for itself twice over: (1) in improved uniformity and (2) in the aftermachining costs it eliminates.

- \* LOCALIZED HEATING MINIMIZES DISTORTION
- \* RE-MACHININ ELIMINATED
- \* UNIFORM
  HARDENING
  CUTS
  REJECT LOSS
  - \* OVERALL
    PRODUCTION
    TIME SHOWS
    SUBSTANTIAL
    SAVING



THE FELLOWS FLAME HARDENING MACHINE

for circular parts up to 10½ dia. x 2 face or 4 dia. x 4 face, or shafts up to 36 long.

THE FELLOWS GEAR SHAPES

## NEW UNIVERSAL FLOATING CHUCK NO MARRED HOLES NO DOGTAIL MOTION

Operates horizontally in automatic screw machine or turret lathe. Adjustable spring pressure in 4 directions counterbalances weight of tool and prevents marred or hell mouthed holes. Useful in any operation where piloting from the lead hole is required. Write for catalog.

UNIVERSAL

Engineering Company Frankenmuth, Mich.

of operations is not completely uniform, locating the part by its finished surface in subsequent machines introduces a large number of error combinations which can increase the magnitude of any single inaccuracy by three times.

This difficulty in obtaining uniform accuracy is additional to the inherent limitation of a circular indexing machine which makes it impractical to change the number of stations once the number of divisions for the index has been selected.

The precision machining of the frames on the straight-line machine overcomes these problems and facilitates trouble-free conveyor assembly of watthour meters because the frames on which they are built up are uniformly accurate.

### **National Safety Congress**

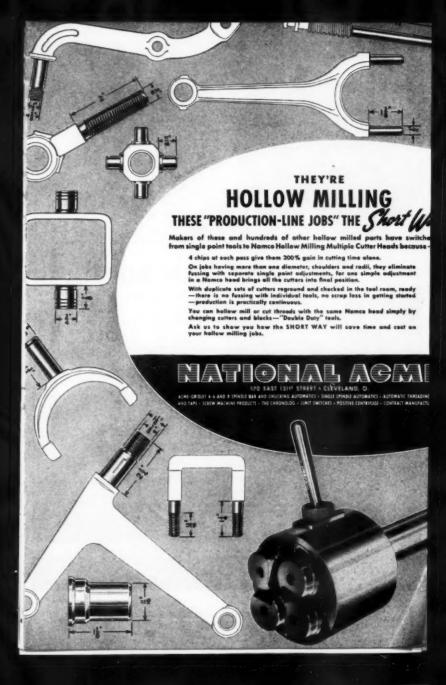
The 30th National Safety Congress and Exposition will be held in Chicago October 6-10. Activities will include the annual meeting of members on the 6th, a banquet on the 8th, and early morning classes Tuesday through Friday on "Human Engineering and Safety."

Sessions on various phases of safety will be held daily. Meetings of particular interest to metal-working executives include: — "Dusts, Fumes, Gares and Vapors," "Maintaining Safety Interest in Defense Industries," and "Electric Welding."

One or more interesting sessions will also be conducted by the following Sections of the National Defense Council:—Aeronautical, Automotive and Machine Shop, Metals, and Power Press Sections. Their programs include a talk on safety and design in hydraulic controls and another on die design for safety.

### Jessop High Carbon-High Chrome Die Steel

A bulletin is announced describing "C. N. S.," an air hardening Jessop die steel. It includes charts depicting its coefficient of expansion. Address Jessop Steel Co., 603 Green St., Washington, Pa.





PRECISION MEASURING INSTRUMENTS

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## Modern Handling Equipment

By GEORGE A. FAIRMAN

PRACTICAL applications of power industrial trucks to facilitate movement of materials in machine shops are shown in the accompanying illustrations. These are Elwell-Parker Electric Co. (Cleveland) trucks, two of which are designed for handling loads on skids and the third for carrying the work on a platform.

Fig. 1 shows rough forged engine crank shafts being delivered to the lathes for machining. A steel skid is used with four vertical pipes in sockets at the corners to hold a stack of crankshafts in place. These are spotted along the aisles near the lathes within easy reach of the operator. Crankshafts are taken off the skid by chain block.

Another skid is also spotted close to the machine on which the finished shafts are placed. Thus when a skid has been filled with finished work, it is taken away by the truck operator. That is, there are two skids at each machine, one for rough forgings and one for finished shafts. The machinist never has to wait for work. The trucks keep the materials on the move and congestion in aisles is avoided.

Fig. 2 shows the handling of finished automotive crankshafts where daily deliveries are made by their manufacturer to the car manufacturer. In order to protect the highly polished surfaces the simple but effective rack



shown in the photograph has been devised. The skids have been designed with an over-all width equal to the length of the crankshafts so that the projecting ends will not hit anything during transportation while passing through narrow spaces. If the skid can get through the shafts also will pass through. The manner in which skids are constructed for building up a load and holding the shafts safely apart shows very clearly in the photograph.



Loaded skids are delivered by the industrial truck to outgoing motor trucks, and when they arrive at their destination, can be unloaded by the same type of power industrial truck.



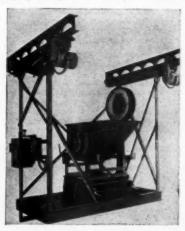
A load-carrier power truck in use in a shipyard machine shop is shown in Fig. 3. This truck has a large unrestricted platform for handling bulky

loads such as patterns and cores, etc. It is great time and labor saver.

Traveling Batch Scale Car

A traveling batch scale car has been developed by Cleveland Tramrail Division of Cleveland Crane & Engineering Co., Wickliffe, Ohio. It can be adapted to the handling of chemicals and batch materials used in a variety of industries.

The car is motor driven and con-trolled by an operator who rides on the platform space provided to the left of the bucket. A variable speed drum controller permits car to be traveled at any speed up to 300 feet per minute.



Double overhead rails make it possible to straddle overhead bins so that their chutes may be brought close to the car bucket.

The unit makes it possible to gather exact amounts from various bins that go to make up batch. Scale on the car accurately weighs ingredients as they are dumped in. The bucket is easily emptied by tilting through use of a crank wheel.

The unit illustrated will handle batch loads of one-half ton. Other Cleveland Tramrail traveling batch scale cars can be provided to meet individual re-

quirements.



## ROTO-CLONES

## Collect Grinding Dust at Cincinnati Bickford Tool Co.

Lower view shows three types of grinding stations served by the bat-tery of 5 type D Roto-Clones. These stations include floor grills, rectan-gular and round tables.





The collection of fine floating dust from portable grinding in Cincinnati Bickford's enlarged finishing department is performed by 5 type D Roto-Clones. These units serve 10 stations comprising 4 floor grills, 4 rectangular tables, and two round tables. A total of 51,000 cubic feet of air per minute is exhausted which carries the generated dust downward from the grinding tools through grilled openings beneath the work.

Complete information on the application of the Roto-Clone to all types of industrial dust control is available without obligation. Write for Roto-Clone Bulletin No. 272.

AMERICAN AIR FILTER CO., INC.

309 CENTRAL AVE., LOUISVILLE, KY. In Canada, Darling Bros. Ltd., Montreal, P. Q.

ROTO-CLONE DUST CONTROL SYSTEMS



Patent No. 2052443 Write for your Circular. Illustrated is No. 4 Universal with adjusting shaft of % square. Takes wire up to ¼ sdiam.

THE JOHN BLANER CO.
Corner Meek & Elm, Sharon, Pa.

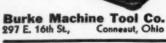
## BURKE

MILLING MACHINES

Motor Driven

Timken roller or ball bearings to spindle

Write today for circulars.



### **Drum-Dumping Stacker**

Lewis-Shepard Sales Corp., Watertown, Mass., announces a recent development for handling the dumping of drums. barrels. etc.

This equipment permits control of the dumping operation by the operator from the floor, which eliminates standing on boxes, improvised platforms and the like.



A self-locking worm makes it possible to hold the drum for as long as desired at any position. Control from the floor also permits the operator to reverse the tilt of the drum or barrel to slow down or stop flow of material from the container.

### **Pneumatic Impact Carriers**

A recent development in the materials handling field is the pneumatic roller, for carriers on belt conveyors, wherever shocks of impact are excessive. These Carriers are especially designed for use under loading spouts and in belt feeders where the impact of heavy bulk loads subjects both conveyor belt and carrier to abnormal strains and wear. To cushion the impact of materials (and thereby prolong conveyor belt life), the rollers in these carriers are made up of a series of



## FAIRBANKS · MORSE 🍘 MOTORS

BUEST PROMES SLEETHICAL MACHINESY RALADAD EDIDPHOYS WADRES-ROMERS STORERS PUMPS FARMANCE SCALES WATER SYSTEMS FARM COMPRESSY ARE CONDITIONEDS pneumatic rubber units, 6" in diameter, suggestive of miniature automobile tires. Their advantage over a solid roller has been compared to the advantage of the pneumatic tire for trucks and automobiles over the now obsolete solid rubber tires: greater resiliency to shock and impact and increased life.

The rollers are mounted on the steel hub in which bearings and shaft are housed. Roller units have thick, wearresisting treads and are inflated and



permanently sealed to prevent loss of air. The assembly is built for easy servicing and quick replacement of damaged units. The carriers are identified as "Style No. 711 Pneumatic Impact Carriers" and are made by Stephens-Adamson Mfg. Co., Aurora, Illinois.

### Automatic Safe-T-Tongs

A new type of Automatic Safe-T-Tongs has been designed to lift annealing covers from stacks of steel in coil form. Made of forged nickel-chromium - molybdenum steel, corresponding to S.A.E. 4340, heat treated to provide ample strength along with toughness to resist shock loads, these tongs eliminate the necessity of a ground man placing chains or hooks on the extremely hot covers.

Being fully automatic, all that is required is to lower them on the work, and the tongs do their job without the

aid of a ground man.

First used in steel mills, new types have been developed for lifting paper bales, boxes, pipe, wire, sugar racks and similar materials. Lifting capacities run as high as 200,000 pounds.





## Information About Our Production

We wish you could see our plant right now. If you could, you'd understand, a lot better, why your orders have been delayed.

The situation is that our business is practically double that of last year! The rush of jobs caused by National Defense work really taxed our capacity. For a while, with all those extra orders pouring in, we were really "snowed under."

But as fast as we could, we've added more floor space—added more equipment—added more skilled men in every department. Now, with our increased plant capacity, and facilities, it looks like much clearer sailing ahead.

We want to tell all you loyal customers how much we've appreciated your helpful, cooperative attitude. We know that some of you were inconvenienced by our slow deliveries, and we're sincerely sorry. But we want you to know of our improved facilities, and to assure you that your orders will be taken care of just as efficiently and promptly as the national emergency will permit. And thanks again for your splendid cooperative spirit!

### DAVIS BORING TOOL DIVISION

Larkin Packer Co., Inc., St. Louis, U. S. A.



## CLEVELAND

### Finger-Tip Controlled TAPPING MACHINE

This new machine is 90%. automatic\_start the ti and it creates its own lead. Holes can be tapped to different depths without changing the stop gauge. With the Cleveland you can tap up to 3/4 capacity. Some of the advanced features are: split second reverse; finger tip control; double depth stop. Taps over 30 holes per minute.

Write for data covering this new and better tapping machine,

### Cleveland Tapping Machine Co.

1721 Superior Av. Cleveland, Ohio



GREATER PRODUCTION! BETTER WORK! ON THE LINLEY NOISELESS RIVETERS

Sturdy, fast, easily operated! Put your production rivet spinning jobs on Linley Riveting machines and watch your costs come down.

We are glad to demonstrate the quality of work that can be turned out. Send us samples of your parts and you'll be impressed with what you can do and how little it will cost you. Sizes and types available for iron or cold rolled steel rivets up to 3/8\* with capacity for larger rivets of softer materials.

Write for descriptive bulletins.

LINLEY BROS. CO.

11 MONTAUK ST. BRIDGEPORT,



In plants where material has to be handled by crane or hoist, which includes practically every industry, the use of these tongs, produced by Heppenstall Co., Pittsburgh, Pa., is said to decrease hazards to life and limb, and to cut lost time to a minimum.

Lyon Welding Benches

Two new welding benches have been developed by Lyon for use in vocational and machine shops, etc. bench is specifically designed for gas welding with frame built to support a fire brick top 34" from the floor. Bench has shelf with four separators for welding rods and additional space for storage.

Another bench now in production is for arc welding and has a 35" high shield on back and sides of a smooth heavy 10-gauge steel working top 33" from the floor. This table also has shelf and rod separators.

Address Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill., for Bulletin No. 331-D.

Spring Balanced Hinged Section

Lewis-Shepard Co., Watertown, Mass., have made available for general industry, a special spring balance device for easing the raising and lowering of



### WE RENEW OUR PLEDGE

Two years ago, at the beginning of the present war with its uncertainties and threats to the future of all industry, this Company publicly pledged itself not to increase its selling prices.

On this, the second anniversary, we again publicly renew that pledge.

During the last two years we have not only kept the pledge previously made, but we have actually reduced our selling prices by more than 6% because of more efficient operation made possible by the marvelous cooperation and ability of our organization. This was accomplished in the face of rising labor and material costs, both of which have been increased by considerable amounts.

It is our belief that the only hope for the continuance of the present industrial system now threatened from within and without is in its ability to give more and more to the consumer for less and less of his dollar. This is the strength of American individual initiative. This is the hope of our country's future. If American industry can accomplish this universally, we need not fear dictators either at home or abroad.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio October 2, 1941

F. Teccertu

the hinged section of portable elevators where fairly frequent hinging opera- frame, enabling one man to raise and tions are necessary.

The illustration shows one man balancing the hinged upper section of a Stacker on the tips of the fingers of one hand.

The raising and lowering of heavy hinged upper section, hitherto often a clumsy and difficult operation, and sometimes even dangerous, has been thus made easy and safe. Powerful compression springs within the cylin-

ders balance the weight of the upper lower the frame quickly.



This spring balance will balance hinged sections eight feet, sometimes longer, in length. It can be included on all hinged types of new Stackers.

### "Never-Slip" Clamps

An improved style of safety lifting clamp, equipped with a replaceable, grooved, hardened steel jaw liner is announced.

### DRILL JIGS



These Jigs are now supplied with Universal jaws which permit quick set-up for end drilling and tapping.

The reversible "V" plates accommodate diameters from 16" to 14" on the 6" Jigs; and 14" to 1" on the 8" Jigs.

### HEUSER MFG. CO.

1638 N. Paulina St.,

Chicago, III.

### HARD USAGE Doesn't Faze The HARTFORD MILLING VISE



Because it was designed to "take it"—and it does! It will stand up, day after day, under the heaviest, toughest strain of production milling work. Made of the best materials, with all parts interchangeable, it will outlast four of five ordinary view. Rapid and accurate in operation—the top eccentric handle gives retraenances spick-opening and return. A trial in your shop will coavince you better than anything we might say.

Write for Folder and Complete Details 114 Jaw width. Maximum opening 3½1
Weight ...... 40 lbs. Jaw depth

Also made in the swivel-jaw type with hard or soft jaws, maximum opening 24°. HARTFORD SPECIAL MCHY. CO.

285 HOMESTEAD AVE.

## KENNAMETAL STEEL CUTTING CARBIDE TOOLS



Turning Garand rifle barrels in a Fay-Automatic with four KENNAMETAL tools.



Cutting off 90 MM. shells to length and centering the base simultaneously.



Turning bomber landing gear cylinder at 180 ft. per min. and .046" feed.

## Save thousands of man hours on defense jobs everywhere

In gun factories, in shipyards, in Government arsenals, in airplane plants . . . virtually everywhere that steel is being machined for National Defense, you will find KENNAMETAL carbide tools on the job. Because of its faster cutting speeds, KENNAMETAL increases the production of both men and machines from 30 to 50% ... saving thousands of man hours urgently needed in the Defense effort.

Despite the tremendous demand for KENNA-METAL, shipments of Standard and Modified Standard tools are made within 10 days of receipt of orders; standard tool tips within 3 to 4 days. Some Standard KENNAMETAL tools (supplied in grade KM only) are now carried in stock for immediate delivery. Write for weekly stock list.

#### SOME STANDARD KENNAMETAL TOOLS





Visit the KENNAMETAL Exhibit at Booth D-55. National Metal Congress and Exposition.

## PROMPT DELIVERY



**Heavy Duty Spot Welders** 



Dyer Welders are available in a wide range of sizes and capacities—air or foot operated, giving maximum production—simplicity of operation—power economy.

#### Floor models 10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

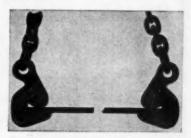
Bench models 21/2 to 10 KVA\_with or without pedestal.

Few Territories



The Topeka Foundry & Iron Works Co. 300-332 Jackson St., Topeka, Kansas

These clamps, made for either horizontal or vertical lifting of steel plates, sheets or sections, are available in 10 styles for handling material weighing up to 12 tons, and from 1/8" to 6" in thickness.



A replaceable plate lines face of the jaw and extends life of the clamp as well as contributing to its lifting and holding qualities. The plate is readily replaceable in the event of wear.

Complete information is available from the Never-Sip Safety Clamp Co., P.O. Box 448 Grand Central Annex, New York, N. Y.

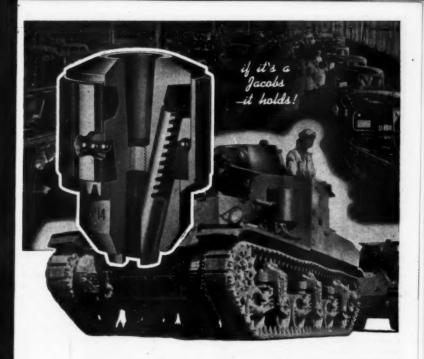
### **Hydraulic Truck Bulletins**

Three interesting materials handling bulletins are offered by Lyon-Raymond Corp., Madison St., Greene, N. Y. (formerly Lyon Iron Works). One of these is a 6-page folder in color, devoted to Hydraulic Elevating Tables. It presents the different Lyon models, with sizes, specifications, pictures and descriptions of the mechanical features. A second bulletin presents the different sizes and types of Hydraulic Lift Trucks with specifications, illustrations and mechanical descriptions.

A third bulletin, No. 123, devotes a four-page spread to Lyon Hydraulic Lift Trucks. Specifications, mechanical descriptions and photos of typical applications are presented.

### Free-Flow Conveyors and Feeders

A new vibrating conveyor and feeder known as the Free-Flow is announced by the Standard Transmission Equipment Co., 416 West 8th St., Los Angeles. It operates on the lift-throw principle



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BY AUTOMOTIVE MASS PRODUCTION METHODS MEANS USING CHUCKS BY

## **JACOBS**

THE NATIONAL STANDARD FOR NATIONAL DEFENSE

THE JACOBS MANUFACTURING CO. HARTFORD CONN.



with motion of the trough becoming increasingly horizontal with the progress of each cycle, thus imparting to the conveyed material a gentle, forward motion. This motion is so designed as actually to suspend the mass in the air with only momentary contact with the trough on the upward period. Thus suspended float-action is claimed to minimize wear from abrasion, and the most fragile material can be conveyed without fear of breakage.

The trough is self-cleaning, without the use of chains, flights, etc. Because of this, different materials can be al-

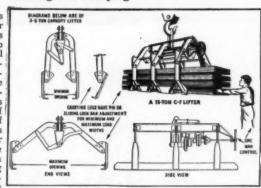
ternately conveyed, or perishables handled without fear of residual contamination. The oscillating arms actuating trough are mounted in special rubber bushings, which store the forward and return forces, thereby reducing power consumption. Self aligning, precision ball bearings are used throughout. The trough can be of any desired material, open or enclosed for handling hot gaseous or dusty materials. By means of variable speed control of the rate of oscillation of the trough, volume can be controlled as desired, and the material can be conveyed up inclines to 15 degrees.

### Lifting and Carrying

Whether the load is narrow or wide, thick or thin, C-F Sheet Lifters are quickly adjustable to lift and carry sheet steel and other hard-to-handle materials without injury to men or damage to materials. It is asserted that these lifters eliminate the hazards of shifting loads, and of sling injury to edges and surfaces. Another advantage stressed is one man control which makes for handling economy. The quick action of the carrying legs

saves time in loading and unloading. The lifters are made in capacities of from two to 60 tons, and larger if required. Address Cullen-Friestedt Co., 1321 S. Kilbourn Ave., Chicago, Ill., for bulletin SL-21 showing many varied

applications.



### Two-Wheel Welding Truck

A new hand truck designed to carry an oxygen cylinder, an acetylene cylinder, and a complete welding and cutting outfit, is announced by The Linde Air Products Co., a Unit of Union Car-



Speed-Up Your Machine Tool Operations. Install LIMA GEARSHIFT DRIVES on all types of Metal and Wood Working machines requiring Selective Speeds. Sizes from 1 to 25 H.P. TOOL-UP with LIMA GEARSHIFT DRIVES. WRITE FOR COMPLETE INFORMATION . . . .

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bide and Carbon Corp., 30 E. 42d St., wrenches, has been increased. New York City.



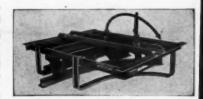
Known as the Oxweld T-7 Two-Wheel Welding Truck it is light in weight, well balanced, and has 14" wheels equipped with semi-pneumatic rubber tires. The T-7 weighs considerably less than the former all steelwheeled trucks which it replaces. It is easy to handle over rough places. The new design results in a 41/2 duction in overall width of the truck, permitting passage through narrower openings. As an added feature, the size of the removable metal tool box, for extra blowpipes, tips, goggles, and

### Air Operated Switches

A new air-operated switch has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, for use on cab-operated, gravity, or automatic dispatch overhead materials handling systems.

This development enables the tramrail operator to pre-set the switch at some distance ahead while traveling and thus lose no time. Likewise, indexes on gravity or automatic dispatch carriers may be set to actuate trippers which will cause one or several switches to take the positions desired.

The switch is ruggedly built of steel welded. It consists of two main assemblies - an outer supporting frame and an inner sliding frame. The outer frame is designed for bolting rigidly to the super-structure. The inner assembly, carrying a straight and a curved rail, rides on multiple easy operating rollers, and is set in position by an air cylinder.



Systems employing Cleveland Tramrail air-operated switches can be furnished in all capacities up to 5 tons.

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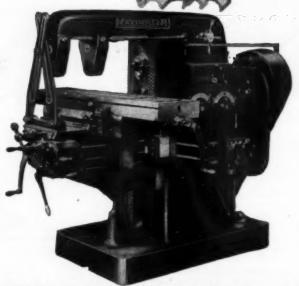
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STREET AT PROGRESSIONS TO THE SACTORY AT MILWAUKER WISCONS

# Arc Welding Repairs Sabotaged Ship

MAKING possible what is reported the speediest repair job of its kind ever performed, where speed was essential to restore much-needed cargo tonnage to service with minimum delay, the electric arc process of welding has again demonstrated its vital importance to National Defense.

This newest and perhaps most spectacular feat of the electric arc is the repair of the sabotaged engine of the S S Villaperosa, interned Italian cargo vessel at the Atlantic Basin Iron Works,

New York.

Repairs were completed in less than 2 months by arc welding, whereas to recondition the ship by installation of replacement parts would have taken at least a year. Welded repairs thus saved 10 months in getting the vessel

back into service to transport supplies which are vital in the international emergency.

Damage to the engine, consisting of breakage of the bedplate into literally thousands of pieces, resulted when the huge crank arms, turned over by compressed air, jammed against heavy pieces of steel which were placed by substeurs on the bedplate underneath the ponderous arms. The pieces of bedplate were said to resemble little more than the parts of a huge metal jig-saw puzzle when the repair crew started to work.

The principal damage, caused when the 19" diameter crankshaft jammed the huge arms onto the steel resting on the bedplate, was at the approximate center of the engine and in the



Fig. 1—The "Ship's Doctor" (arc welding operator) at work on innards of the engine, repairing damage resulting from work of saboteurs.



Fig. 2-Arc welding some of the many breaks in the engine bedplate.

middle of the frame.

Arc welded repair consisted of fusing the many broken pieces of cast iron back together and joining re-inforcing steel plates to steel dowel pins inserted in the bedplate. "Ferroweld" and "Stainweld A5" arc welding electrodes, together with 200-ampere electric motor driven Lincoln "Shield-Arc" welding machines were employed for the work.

First step of the work was the veeing-out, or beveling, to 45 degrees of each broken piece of cast iron. This was followed by fitting the various pieces in place and tack welding (this consists of applying a small but sufficient amount of molten weld metal

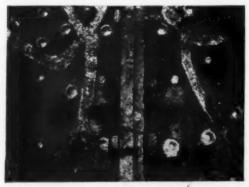
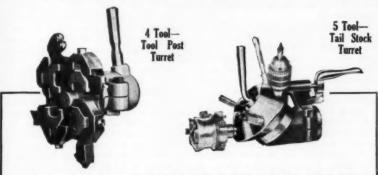


Fig. 3—Welds joining broken pieces of cast iron bedplate are shown here — also, the steel dowel pins holding steel reinforcing plate in place.

# Two Steps Toward INCREASED PRODUCTION

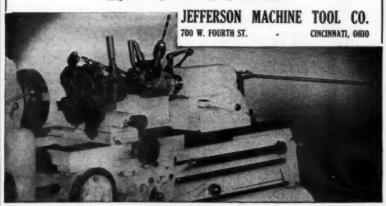


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to adjacent parts to hold them firmly in position for the final, or continuous, welding). In quite a few instances, it was found necessary to make pieces of steel to replace pieces of cast iron which could not be found. In such cases, the pieces of steel were cut to a size and shape conforming to requirements.

Arc welding of the cast iron was done in accordance with standard procedure for Lincoln "Ferroweld" electrodes made expressly for work in cast iron.

Narrow beads - deposits of weld metal-never exceeding 3" in length were employed and the work was prevented from becoming too hot in order to avoid warping. Keeping the work cool by resting between welds, each bead, or weld, was lightly peened by hammer before proceeding with the next. In Fig. 3 can be seen some of the welds joining broken pieces of cast iron to the main structure of the bedplate, also the steel dowel pins

holding the steel re-inforcing plate in place.

Following the arc welding of all broken pieces of cast iron back into position, steel plates were fitted to the outside of the engine bedplate and holes drilled through the plates and the cast Steel dowel pins of approximately 1" diameter were fitted into these holes and arc welded to the steel plate and to the cast iron. A special taper at each end of the pins allowed deep penetration of the weld metal into both the steel and the cast iron. Figs. 1 and 2 show actual welding of the bedplate.

The speed with which the welding was done by the electric arc process. as compared with other methods, was reported due to the fact that with the electric arc no preheating of parts to be welded is necessary. All that is required is to shape the parts, properly fit them and finally simply fuse them together, allowing time between welds to keep the work cool.

By its advantageous use in this instance, electric arc welding proved itself a fast-working tool for mechanical and structural repair needs. It is being employed in all types of defense production because of its versatility and the high speeds it permits in the construction of ships, planes, tanks, guns, combat cars and other vital defense equipment.

(Photos—Courtesy Lincoln Electric Co., Cleveland, Ohio)



cost of removing the broken one by any other method. WALTON BACKS it out: saves the thread (and your

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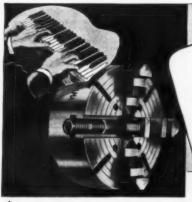
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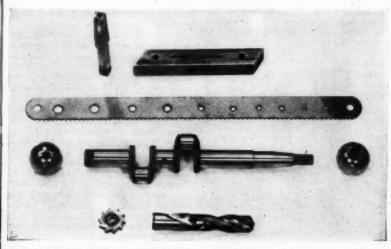
THE CUSHMAN CHUCK CO. HARTFORD, - CONN.

# **Drilling Hardened Steel**

#### By L. G. BLACK

ONE of the outstanding developments in metal working presented to industry in recent years, is the "Hardsteel" method of drilling, countersinking, or counterboring hardened steel. These drills are made from metal, the analysis and treatment of which are closely guarded secrets of the manufacturer. The drilling operation has amazed men who have devoted their lives to metal working.

Gone are the days when the procedure of putting a hole in hardened metal involved annealing the piece, drilling it, re-hardening it, and then throwing it away, and making a new piece. These new drills have been used successfully on carburized, oil-hardened, water-hardened, cyanided, and nitrited pieces of any degree of hardness, of high carbon, high chrome, and high-speed steels, although the manufacturer prefers that the performance range run from Rockwell 35-C up, as hard as metal can be made. In fact, the manufacturer oftentimes uses



Versatility of the process is shown by these typical examples of various steel objects drilled after hardening.



Here's how the point is ground on a regular type of drill.

this slogan:— "If You Have Hardened It, We Can Drill It." No skilled help or special equipment is needed to use these drills, although it is important that the speeds suggested by the manufacturer be adhered to. Briefly, the formula is this:— Around 1500 r.p.m., for drills of ½", 1200 r.p.m., for ½" drills, 1000 r.p.m., for 3%" drills, 900 r.p.m., for a ½" drill, 800 r.p.m., for a ½" drill, 600 r.p.m., for a ¾" drill, 600



Drilling under water with the work immersed.



Clearance is provided in this way on a drill of the regular type.

r.p.m., for a 76" drill, and 500 r.p.m., for a 1" drill. It is important that these speeds be maintained under load, and that the spindle does not slow up while working.

During the drilling operation, the drill should be run at the suggested speeds, bringing the point to bear on the piece, and applying sufficient pressure to start the drilling operation. At this point, in a freshly-ground drill, the extreme tip will flatten slightly. This is necessary before the cutting action of the drill will start. After the chips once start to roll out, only sufficient pressure is maintained to keep the chips coming. This prevents annealing away from the walls.

It is definitely not necessary to sharpen "Hardsteel" drills until they have reached the point where they will not cut. Up to ½" "Hardsteel" drills are solid metal, and as long as the flute is of sufficient length to penetrate the metal or make the hole, they can be used. Over ½" drills are tipped with 2" of cutting metal.

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OCTOBER 1941

MACHINE TOOL BLUE BOOK

118



This is how clearance is provided on a flat bottom drill.

Reasonable care must be taken during grinding to maintain approximately the angles and lands of the original drill. These drills are best sharpened on the side of the wheel rather than the face, to give flat surfaces, rather than concave at point of drill. The little notch in the side, or the so-called "chip clearance groove" is put on the corner of an emery wheel by rocking the drill across the corner.

In the case of "flat bottom" or counterbore drills, the hole should first be drilled with a round bottom "Hardsteel" drill to the point where the tip's penetration of the drill is close to the maximum depth required of the completed hole, and the hole then cleaned out to the desired depth with a counterbore or "flat bottom" drill. In other words, the drill must be given something to center itself in, or there is a possibility that it will snap because of creeping about, trying to locate itself.

Ordinary drilling operations are handled "dry." However, there are cases



Face of a flat bottom drill is being ground in this operation.

in which it is necessary to maintain absolute hardness at the walls, or where the drill press is not equipped with a coolant pump. The entire vise and piece are submerged in a pan of clear water of sufficient depth to cover the entire piece to be drilled. When the press is equipped with a coolant pump, clear water is directed over the entire piece. It is important when drilling in



Drilling under water with a flowing stream.

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this manner, that increased speed be used to compensate for the cooling properties of the water. No speed table can be set up to take care of this operation, inasmuch as the increased speed is more or less determined by the volume of water, by the size and volume of the piece, and by the character of the metal. This method of drilling with clear water as a coolant, has been successfully used on many types of high carbon, high chrome, and highspeed steel. The advantage of this type of drilling is best illustrated in this way:-Drilling a ball bearing in open air, without coolant, the entire outside of the ball becomes blue-back, but drilling the same type of ball bearing under water, no discoloration occurs. The bearing is just as shiny, and of the same color as when the operation started.

One of the most startling features of this drilling in hardened metal, is that

There is no flow interest on the state of th



the hole is just as smooth as a burnished surface. There is no tearing of metal, and the hole is finished when the drill is through the metal. Every hole has the appearance of a ground, polished surface. That being true, "Hardsteel" drills are being used more and more as reamers. The manufacturer says that any amount of metal from 1/32" on the side up, may be taken out. This is true, even in cored holes.



Drilling dowel pins holes in a die after hardening.

Since the drill can be used as a reamer, it follows that any hole may be enlarged. This feature is applied in industry, in enlarging worn holes, or in bringing to shape, out-of-round holes.

Because the drill has no bearing or cutting surface presented to the sides of the hole, these drills have a resistance to abrasion which is almost unheard of in high-speed drills. As an outgrowth of the drill cutting only on the bearing surface of the tip and not on the sides, with a slightly different grind on the tip, the drill has been very successfully adapted to the Bakelite and Plastics industries.

"Hardsteel" drills are made in two styles or points:—One, the so-called regular, or pointed drill, and the other, the bottoming type for counterboring, or bottoming holes.



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# Guarding Industrial Health

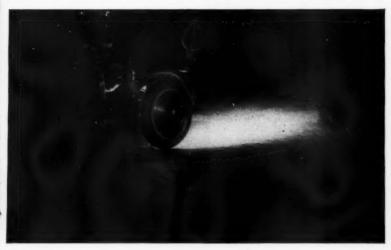
#### By PAUL ANDERSON

IN THESE times of intensified defense activity, every man-hour lost means greater delay in the production of vital equipment. Added to the problem of priorities and the shortage of skilled labor, is the ever-increasing danger of industrial dermatitis. A recent estimate, based on figures from the U. S. Public Health Service, places the yearly toll of skin diseases at approximately seven million dollars. The machine tool industry accounts for a definite percentage of this total.

The cause of skin diseases in this industry often is traced to use of cool-

ing lubricants or cutting compounds. These include vegetable, mineral and animal oils, solvents and other compounds, including water and caustics. In the past, protection against "oil acne" or "oil boils" was based on the introduction of various antiseptics into the oil. Sterilization of the oil through heating and the elimination of infecting materials by means of centrifugal separators were also a part of the protective technique.

Tests which have been conducted over a long period of time disclose that, for the most part, the antiseptics used



In addition to ordinary precautions, protection for welders must be of such a nature as to block the infra - red and ultra - violet rays which cause irritation and skin burns.



in the oils or other cutting compounds were not entirely soluble. It was therefore impossible to get a solution of constant strength. This variation often resulted in a precipitate which rendered the solution wholly ineffective. There was also the danger of over-concentration, resulting in irritation to the skin, caused specifically by the antiseptic.

Despite conflicting claims regarding the use of antiseptics, the real danger is in the oils themselves, as well as in certain solid materials for which the oils are an ideal vehicle. These solids cause the dirt from the machined parts to accumulate on the skin and plug up the hair follicles. This purely mechanical action is the true basis of most skin disorders in the machine tool industry, according to recent studies.

Still another source of irritation and ir lection is found in the treatment of m²tals before they reach the tooling stage. High concentrations of acids are used in hardening or pickling processes. The residue remains on the metal until it comes into contact with the cutting compound. Thus we find a concentrated acid which plays havoc with the hands of men operating machine tools. Moreover, the distillation of petroleum for use in lubricating or cutting is essentially an acid process. It is easy to

understand how oils can be contaminated with acid and consequently dangerous.

From the foregoing, the conclusion must be drawn that complete protection for the worker can hardly be found in the treatment of lubricating or cutting compounds. There are too many variable factors involved. The focal point of protection, therefore, should be the skin of the worker.

A similar problem exists with regard to protection for arc welders. In addition to ordinary precautions, the protection must be of such a nature as to block the infra-red and ultra-violet rays which cause irritation and skin burns.

One of the most effective protective measures to date, is the use of mechano-chemical preventatives. welding, for example, the requirement is a bland cream, entirely harmless to the skin, incorporating a pigment which effectively blocks the rays mentioned. With respect to cutting oils and the like, the solution rests in the application of liquids or creams that are insoluble in the lubricating or cutting compounds. These preventatives must be physiologically and chemically inert so that in and of themselves, they could not constitute a source of irritation or discomfort.

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It should be noted that no single protective liquid or cream can be used with equal effectiveness under all operating conditions. The variations in the formulae of lubricating oils and cutting compounds require laboratory study before the proper defense can be prescribed.

For example, the use of certain solvents in the petroleum and hydrocarbon field exercises definite toxic properties through absorption by the skin. Laboratory tests have shown distinct changes in the composition of the blood stream. While there are standard formulae to cope with this particular problem, the new situations which constantly arise need individual study.

The increased interest in the use of mechano-chemical prevention of industrial dermatitis among machine tool workers indicates that previous techniques are unsatisfactory. The factors listed above suggest that the protection should be on the worker, rather than in the materials with which he works.

It is not claimed that mechano-chemical preventative measures are the sole factors in the fight against industrial dermatitis. Other contributing elements include an examination of the type of soap used for washing-up, the condition of the washroom facilities. the prevalence of fungus infections, hypersensitivity of individual men employed, proper ventilation, and general plant hygiene. However, granting optimum conditions with regard to these various other elements, this writer believes that the most effective way to prevent industrial dermatitis is to provide workers with easy-to-apply, harmless, inexpensive, but highly effective liquids and creams.

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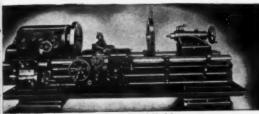




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       Gear Box.
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    - All gears and shafts of alloy steel, heat-treated and accurately finished.

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### The Question of the hour:

## How Can We Substitute?

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There are two kinds of substitutions you can make which will effectively aid in National Defense: (1) Substitutions to conserve strategic materials, (2) Substitutions to conserve production time. Certain Jessop Steels will help you conserve in both directions:

# FOR CONSERVATION OF MATERIALS

SILVER-PLY Stainless-Clad Steel offers great savings in nickel and chromium. The average sheet or plate is made with a 20% stainless steel cladding, therefore SILVER-PLY uses only 1/5 as much stainless alloy as solid stainless.

MOGUL Molybdenum-Tungsten High Speed Steel affords considerable savings in tungsten, as it contains only 1.30 to 1.80% of this strategic element. It performs equally as well as 18-4-1 for most applications, and in many cases results in superior performance.

# FOR CONSERVATION OF PRODUCTION TIME

High Carbon-High Chrome Die Steels. Jessop's "3C", "CNS", and "WINDSOR SPECIAL" die steels are extremely resistant to wear... minimizing down-time for regrinding dies and assuring long die life.

TRUFORM Non-Shrinkable Die Steel is an oil hardening die steel which is very easy to heat treat . . . virtually eliminating waste of materials and time due to inexpert hardening.

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If you cannot attend the show, write for our special booklet.



JESSOP STEEL COMPANY

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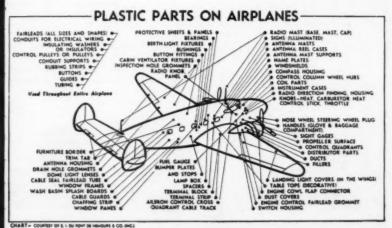
# Plastic Parts on Airplanes

PLASTICS of crystal clarity for windshields, windows, turrets, navigation "blisters" and other parts of modern aircraft are said by aeronautical engineers to be the plastics industry's greatest single contribution to aviation.

They constitute permanent improvements to modern aircraft, as distinguished from "substitutes" merely to replace other materials which are temporarily scarce.

These transparent materials improve the range and clarity of vision while protecting passengers and crews on high-speed planes. The new acrylic resins, which stem basically from coal, air and water, and cellulosic plastics are used for these parts. The acrylics and other plastics materials are particularly adaptable to the aviation industry because of their inherent strength, durability and light weight. Separate plastic parts range from scores on a small plane to hundreds on a large one; their applications run into the thousands.

The acrylics are said by engineers to have many advantages. "Lucite" methyl methacrylate resin, for example, weighs about half as much as duraluminum and one-sixth as much as ordinary steel. It is strong, standing up against wind resistance of more than 500 miles an hour; it has exceptional durability and is shatter resistant; it maintains its original clar-





You know well the demands for increased production today being thrust upon machine tool manufacturers. To expand output they overlook no operation when making time-studies. One of the largest machine tool builders tested (appewell power blades, then wrote us a letter in which they said: "These saws turned in to us the best performance we have had." Would you like to know how Capewell precision-cutting hack saw blades might help to speed work in your own plant? Simply ask your mill supply man.



ity under varying flight conditionssun, snow or rain.

"Lucite" also lends itself to mass production methods. Made pliable by heating to a predetermined temperature, it can be easily formed into desired shapes. Finishing processes, such as drilling, cutting, bevelling and polishing, are done with standard tools.

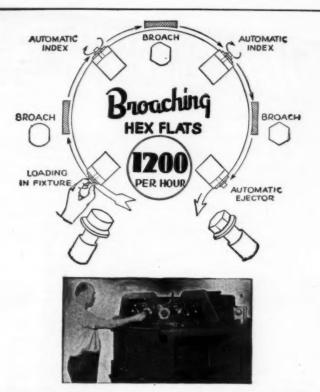
In addition to the acrylics, cellulosic plastics, of which the principal ingredient is cotton linters or wood pulp, are extensively used on aircraft. Parts of cellulosic plastics vary from drainhole grommets to antenna housings, from dust covers to the surface of a propeller.

Included among this wide variety of parts are berth light fixtures in Pan-American clippers and other commercial ships, cabin ventilators, all types of conduits, lenses of many descriptions, handles and knobs, grommets, protective sheets and panels, sight gages and tubing.

There is a long list of parts made from the older thermo-setting materials. New parts appear almost daily on planes on the production line. Each new and improved plastic finds ready application in the booming aviation industry.

Aircraft manufacturers are spending large sums in plastics research. Plastics manufacturers spend even larger sums in devising new and improved plastics, not only for aviation, but for other industrial purposes.





AMERICAN recently furnished a large aircraft parts manufacturer a standard AMERICAN 36<sup>1</sup> Rotary Broaching Machine for broaching hex heads on aircraft bolts.

The illustration at the top of the page shows the eyele of the part from loading to ejection.

In the broaching process an accuracy of .001 is held across the flats and the depth of the hex head is maintained within .010.

This is another example of the adaptation of AMERICAN equipment for high production of defense parts.

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## The 1941 Metals Show

THE National Metal Congress and Exposition, combining the metal world's largest industrial exhibit and sessions for principal technological societies dealing with metals, will meet in Philadelphia for five days beginning October 20th.

The 1941 Congress and Exposition will be the largest in the 23 year history of the event, according to Wm. H. Eisenman, Managing Director, More than 105,000 square feet of exhibit space has been taken by exhibitors representing every branch of the metals and associated industries. Extensive technical programs of the American Society for Metals, The American Welding Society, the Wire Ass'n and the Iron and Steel division and the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers will be held in conjunction with the show. Technical sessions are generally

scheduled to be held in Philadelphia hotels as well as at the larger meeting rooms in the Convention Hall.

The theme of the 1941 Congress and Exposition is "New Aids To National Defense Production" — an appropriate keynote by virtue of the gigantic defense program now under way. Every item and method to be seen will have direct relation to the preparedness program.

The welding industry will be represented by all types of welding:—arc, spot and resistance; by gas welding and oxy-acetylene gas and gas cutting equipment. Included in this group are electrodes and electric controllers as well as various grades of welding wire for gas and electric welding.

Heat treating furnaces of all types will be on display:—salt bath, annealing-electric, gas and oil fired; induction, atmospheric controlled furnaces of all types and sizes. In addition there will be furnaces and heating equipment for heating rivets and bars; industrial oil heating apparatus and various insulating materials for furnaces and electric heating elements.

In steels, visitors will see tool steel, stainless steel, construction steel, valve steel for aircraft and automotive units, heat and corrosion resistant alloys, sheet, strip, high-speed and other steels. These will be shown in finished form and through products made from them.

In the non-ferrous field there will be aluminum, aluminum alloys, magnesium-aluminum alloys, copper, brass, bronzes, zinc, die casting shapes and forms, non-ferrous wire and other alloys cast and wrought. Machinery for die casting, wire drawing and spring forming will be shown.

The gas industry will be represented by gas fired, heat treating furnaces and many gas heating industrial appliances.

Testing equipment to indicate hardness, tensile, torsional strength, fatigue and many other properties of metals will be demonstrated.

Temperature recording and control equipment will include devices for indicating, recording and controlling temperatures.

Tools of all types will be on exhibit. They include hack saws and files, electric drills, diamond tools, tungsten carbide cutters, diamond test cutters, reamers, etc. Included in this group are abrasive cut-off machines and abrasive wheels.

Plating processes and materials to be shown include plating equipment generators, plating barrels, polishing lathes, induction heating and hardening equipment and methods. Methods in castings will be illustrated, dealing with malleable heat treated and heat corrosion resistant items.

Hundreds of other aids to better production will be shown. They include heat treating salts, carburizing salts, compounds and supplies. Noble metals will be shown in new uses. Handling equipment such as cranes, trucks and hoists is included. Pieces of various optical measuring, metallographic and spectrographic equipment, blue printing machinery and drafting room equipment are to be exhibited. Laboratory equipment to be shown includes polishing machines, chemical determinators and other items for chemistry laboratory work.

Ferro-alloys for production purposes will include nickel, molybdenum, vanadium, chromium, manganese and many other metals in this feld.

Fastener items to be shown include nuts, bolts, screws, rivets and lock washers. Hard surfacing alloys for various parts of industrial machinery will be on display.

Petroleum products, quenching oils, rust preventatives and metal cleaning compounds will be displayed. Sand blast equipment and detergents will be included.



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# Highlights of Defense Technical Sessions

THE 23rd National Metal Congress and Exposition to be held in Philadeiphia for five days beginning October 20th will be headlined by a series of important National Defense Group Meetings on Defense Problems, Conservation and Substitution.

"It is felt that present conditions make it incumbent upon the Society to arrange for its members, for industry and others in attendance at the Metal Congress an intensive picture and study of the situation as it exists at the present time," Mr. Eisenman, Managing Director, said. "It will present an opportunity to have conversant individuals indicate the future trends in important commodities and scarce materials."

Gathered together at one time and in one place in Philadelphia will be the outstanding authorities on manufacture, production and fabrication of metals who at these defense forum meetings will exchange experiences and help smooth out such difficulties and problems as have arisen in the manufacture of national defense material.

Thirteen special defense meetings will present more than a hundred specialists actively engaged in either industrial defense activities or government planning in the present emergency.

On Monday afternoon, Gordon T. Williams of John Deere & Co., will conduct the discussions on "Low Carbon Alloy Steels" (case hardening steels). Summarizer will be O. W. McMullan, Youngstown Sheet & Tube Co.

Topics scheduled for discussion at this session deal with scarce or unobtainable alloy steels, suggestions about substitutes that will not run into other bottlenecks, possibilities of flame hardening in induction hardening and salt bath hardening and changes in mechanical design to permit substitutes,

Monday evening's 8:00 P.M. session deals with "The Manufacture of Shells." Its chairman is Professor A. F. Macconochie, head of the Department of Mechanical Engineering of the University of Virginia. C. B. Dakin of the General Motors shell plant will sum-



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### TWO SAWS in ONE



RAPID MANUFACTURING CO. Box 488, - Glendale, California marize. Included in the discussion of shells are these operations: — shell steels, forgings, castings, spun process, heat treatment, sand blasting, machin-

ing and cartridge cases.

The Monday evening sessions also include "Problems in the Fabrication of Aluminum Base Alloys and Magnesium Base Alloys for Defense Material." E. H. Dix, Jr., of the Aluminum Company of America is the leader. Harry Huester of the Reynolds Metal Co., is summarizer. Points for discussion include aluminum castings and their heat treatment, aluminum forgings and their heat treatment, welding of aluminum and its machining, as well as magnesium castings.

The Tuesday afternoon meeting deals with "Higher Alloy Steels" (oil quenching steels). Dr. M. A. Grossmann of the Carnegie-Illinois Steel Co., will lead the discussion. Harry McQuaid of Republic Steel Co., will be summarizer.

The discussion will include an out-

ine of the functions of principal alloys in steel, scarce or unobtainable alloy steels, suggestions as to substitutes that will not run into other bottlenecks, means of making fine grain steels, evaluation of the hardenability of steel and the substitution of the design of a part to permit substitution.

On Tuesday evening "Copper and Its Alloys in National Defense" will be discussed. Harry Croft of the Chase Brass & Copper Co., will lead the discussion. Major Leslie Fletcher of Frankford Arsenal is named as summarizer. Points included deal with the increase of production by the elimination of unnecessary alloys, standardization of specifications, conservation of copper through the use of temporary substitutes in various industries, use of copper alloys as alternates for scarce metals, copper and its alloys in munitions parts and copper in iron and steel for defense work.

"Stainless and Heat Resisting Steels" will be the topic on the second half of the Tuesday evening discussions. A. L. Field of the Rustless Iron & Steel Co., will direct the discussion of steel, while R. J. McKay of the International Nickel Co., will be leader of the "corrosion" portions of the meeting. Mr. McKay will summarize.

On Wednesday afternoon "High Strength, Low Alloy Steels" (Weldable Grades for Pressure Vessels, Piping, Ships and Rolling Stock) will occupy the attention of the defense group meeting with Col. G. F. Jenks, U. S. Army Ordnance, presiding. Col. Jenks is president of the American Welding

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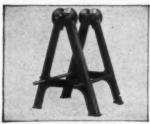
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Society. Dr. James C. Hodge of the Wellman Engineering Co., will summarize.

"The Inspection of Metals" discussion of Wednesday evening will be conducted by Dr. John W. W. Sullivan, Chief, Inspection Division, Cleveland Ordnance District. Lt. Col. C. F. Davies, Office of Chief of Ordnance, Industrial Service, Production Section, will act as summarizer. This session will include as speakers, high officials of the Army and Navy as well as experts in publication and national defense industries.

Thursday afternoon's 2:30 Defense Group meeting will deal with "Alloy Castings" (steel and iron). Co-chairmen are A. L. Boegehold of General Motors and C. H. Lorig, Battelle Memorial Institute. E. J. Hergenroether will represent the Conservation and Substitution Committee. Mr. Lorig will summarize.

The second portion of the Thursday afternoon session will be directed by



Dr. O. E. Harder, assistant director, Battelle Memorial Institute and president, The American Society for Metals. A. Allen Bates, who is Manager, Chemical and Metallurgical Department, the Westinghouse Electric & Mfg. Co., will be the summarizer. Slated for discussion are the replacing of tinbase babbitts by lead-base babbitts, substitutes for bronze bushing and bearings, problems and substitutes in powder metallurgy bearings, cadmiumbase bearings, silver bearings, bearing substitutes in the automotive industry. problems in aircraft bearings and the use of the iron-copper bearings.

Friday's 2:30 session will deal with "Molybdenum High Speed Steels and Tool Steels." Dr. Bradley Stoughton, Chief of Tool Section, Office of Production Management and president-elect of the American Society for Metals, will lead the discussion. G. V. Luerssen of the Carpenter Steel Co.,

will summarize.



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cme Electric Welder Co., Huntington Park, Acme

Calif. Booth A-6.
Acms Industrial Co., Chicago. Booth H-51.
Adirondack Foundries & Steel Co., Watervliet, Booth 298. Polishing Wheels, Inc., Chicago. Advance

Booth G-34. Ajax Electric Co., Inc., Philadelphia. Booth

Ajax Electrothermic Corp., Trenton, N. J. Booth

lien Manufacturing Co., Hartfe Safety set screws. Booth B-39. Allen Hartford, Conn. American Car and Poundry Co., New York, 270 Booth

American Chain & Cable Co., Bridgeport, Conn. Booth A-27. American Foundry Equipment Co., Misha-waka, Ind. Booth D-81. American Gas Furnace Co., Elizabeth, N. J.

Booth C American Gasifier Co., Wallingford, Conn.

Booth F-54.

American Institute of Mining and Metallurgi-cal Engineers, New York. Booth 293. American Machine and Metals, Inc., East Mo-line, Ill. Booth D-29. American Machinist, New York, Booth 3.

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Allie-Chalmers Mig. Co., Milwaukee. Booth Alex Corp., Niagara Falls, New York. Booth

62 Aluminum Company of America, Pittsburgh. Booth \$2.

Aluminum Ore Co. Booth 52.

Alvey Ferguson Co., Cincinnati, Ohio. Booth

American Brake Shoe & Foundry Co., Chicago Heights, Ill. Booth D-23.

American Brass Co., Waterbury, Conn. Booth

American Bridge Co., Pittsburgh. Booth, Stage.

At Photosic IDS

American Magnesium Corp. Booth 52.
American Manganese Steel Div. of American
Brake Shoe & Fdry Co., Chicago Heights,
Ill. Booth D-23. American Metal Market, New York. Booth

A-19. American Rolling Mill Co., Middletown, Ohio. Booth F-31.

merican Society for Metals, Cleveland. Booth 215. American

American Steel Castings Co., Newark, N. J. Booth 298

American Steel & Wire Co., Cleveland. Booth, Stage.

#### Floor Plan of the Exhibits

American Welding Society, New York. Booth Ampco

mpco Metal, Inc., Milwaukee, Wis. cial Bronzes. Booth F-50. rcos Corp., Philadelphia. Welding Arcos Corp., Philo Welding Elec-Cork Company, Lancaster, Pa. Armstrong ( Booth D-35.

Steel Castings Co., Chester, Pa. Atlantic Booth 298

Wire Cloth Corp., Philadelphia. Audubon Booth D-21

Booth 31. Automatic Temperature Philadelphia. Booth 31.

Automotive Industries, Philadelphia. Booth

A-54.

Bethlehem Steel Co., Bethlehem, Pa. Booth D-6. Birdsboro Steel Fdry. & Machine Co., Birds-boro, Pa. Booth 298.

boro, Par. Booth 298.

Black & Decker Mig. Co., Towson, Md. Portuble Electric Tools. Booth 44.

Black Drill Co., Cleveland. Drilling Hardened Steel. Booth B-29.

Blast Furnace and Steel Plant. Booth B-33. Botfield Refractories Co., Philadelphia. Booth

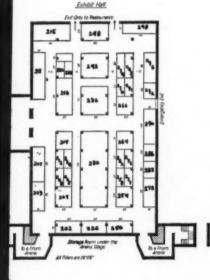
Bradley Washfountain Co., Milwaukee. Booth

Bridgeport Brass Co., Bridgeport, Conn. Booth

The Bristol Co., Waterbury, Conn. Control Instruments. Booth 66.

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Babcock & Wilcox Co., New York. Refrac-Booth 27. tories.

aker & Co., Inc., Newark, N. J. Booth G-43. Locomotive Works, Baldwin Booth E-6.

Bouldwin Southwark Div., Baldwin Locomotive Works, Philadelphia. Booth E-6. Barrett-Cravens Co., Chicago. Booth G-47. Bausch & Lomb Optical Co., Rochester. Booth

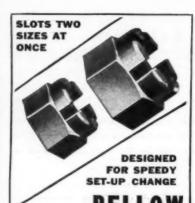
Bennett Insured Steel Treating Co., Newark, N. J. Booth B-54.

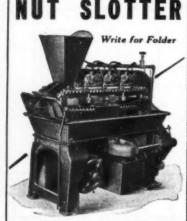
Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia. Booth 63.

Charles Bruning Co., Inc., New York. Booth

Brush Development Co., Cleveland. Booth 26. Bryant Heater Co., Cleveland. Booth Q. Budd Induction Heating, Inc., Detroit. Booth

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Booth H-47.

Callite Tungsten Corp., Union City, N. J. Booth G-5

Boom G-9a.

Cambridge Wire Cloth Co., Cambridge, Md.
Booth C-17.

Campbell Div., Andrew C., American Chain

Cable Co., Inc., Bridgeport, Conn. Booth A-27

Canadian Radium & Uranium Corp., New York. Booth C-28. Carboloy Co., Detroit. Carbide Tools. Booth

E-34 Carborundum Co., Niagara Falls, N. Y. Abrasive and refractory products. Booth 236.
Carnegie - Illinois Steel Corp., Pittsburgh.

Booth, Stage

Booth, Stage.

Carpenier Steel Co., Reading, Pa. Booth 254.

Central Screw Co., Chicago. Booth 220.

Chapman Valve Mig. Co., Indian Orchard,
Mass. Booth 204.

Chase Brass & Copper Co., Inc., Waterbury,

Conn. Booth F.30.

Conn. Booth F-30. Chicago Flexible Shaft Co., Chicago, Booth 74.

Chilton Co. Booth A.54.
Cities Service Oil Co., New York. Booth F-45.
Cleveland Overall Co., Cleveland. Booth B-16.
Climax Molybdenum Co., New York. Booth

D-1. Coffing Hoist Co., Danville, Ill. Booth C-S1.
Colonial Alloys Co., Philadelphia. Booth G-11.
Columbia Steel Co., San Francisco. Booth,

Stage. Continental Industrial Engineers, Inc., Chi-

cago. Booth 19 Continental Machines, Inc., Des Plaines, Ill. Booth B-46

Copperweld Steel Co., Warren, O. Booth B-6. Cramp Brass & Iron Foundries, Philadelphia. Booth E-6.

Crucible S'eel Casting Co., Lansdowne, Pa. Booth 298.

Cyclone Fence Co., Waukegan, Ill. Booth,

Stage.

Deemer Steel Casting Co., New Castle, Del. Booth 29

A. P. de Sanno & Son, inc., Phoenixville, P. Abrasive Cut-off Machines. Booth C-30. Despatch Oven Co., Minneapolis, Minn. Heat treating furnaces. Booth 4.

Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. Booth E.50.
Detroit Rex Products Co., Detroit. Booth 282.
Detroit Testing Machine Co., Detroit. Booth

Diamond Iron Works, Inc. Booth 7.
Harry W. Dietert Co., Detroit. Booth 258.
Henry Dieston & Sons, Inc., Philadelphia. Booth F-58.

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Eisler Engineering Co., Inc., Newark, N. J. Resistance Welders. Booths A-50 and A-6.

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A-6. Booth

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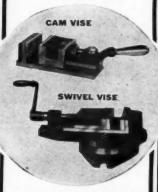
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[]. Fernause, advertising manager; W. E. Hoffman, Eastern representative; and D. B. Trott, Mid-Western representative.

Arc Welding. Booth W. J. Holliday & Co., Hammond, Ind. Booth

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N. Y. Booth A-12.

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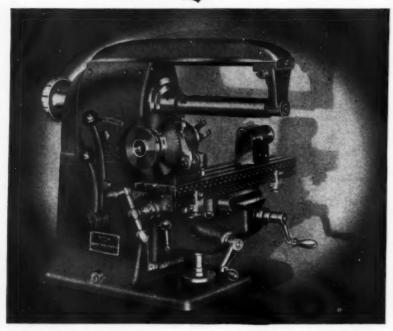
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# Plants Available for Sub-Contracts

SUPPLEMENTING the list published in the September issue, here are in the September issue, here are additional plants equipped to handle

sub-contract work.

Sizeable screw machine and gear cutting facilities are available but due to current demands, these machines are not necessarily listed. If you have need of such equipment, please let us know the dimensions and volume required, and we shall gladly supply further information in that particular category.

Address all communications to Hitchcock Publishing Co., Defense Sub-Contract Dept., 508 S. Dearborn St., Chicago, Ill. Here is a list of plants and their facilities. Watch this section for

additional plants next month.

Firm: AP Firm well known in the machine

Firm: AP Firm well known in the machine tool field. Has the following machines open for subcontract work:—I No. 12BC gear hobber 15" dia. and I No. 3BC gear hobber 6" dia; also I Cincinnati planer 36"x36"x10" and I King vertical turret lathe with 32" table.

Firm: AS One of the best gear cutting plants in the middlewest. Now on one shift basis; have ample space and equipment in their new plant to greatly increase their total capacity. Open shop. Many brand new ma-

chines.

Firm: AV Long established machine shop pecializing in internal and external grinding. Have largest honing machine in middlewest. These people are old time machinists who have steady following. Have these machines 

machine, internal and external grinders. Open shop

Firm: AW Fifty-year-old business specializing in manufacture of steam turbo & gas generators, flood lighting equipment. Medium heavy work. Open shop. Can handle 75 men on one shift; 4 hand screw machines, 4 turret lathes, 3 milling machines and assortment of drill presses, engine lathes,

planers, shapers, grinders.

Firm: AX Manufacturer of electric pumps;

distribution. Have some splendic Have some aplendid machines open for subcontract work:--Universal boring (horz) machine, 24"x36" table; Becker No. 5 vertical milling machine; Gisholt vertical boring machine, 40" dia. work; Sidney engine lathe and Radial Drill (American),

y engine lathe and husband 2 foot size. Open shop. 2 from: AY One of leading manufacturers Firm: AY One of leading manufacturers have two large of air movement equipment. plants open for defense work. Now suffering from lack of priorities in a non-defense activity. Large facilities of a medium to light have aluminum sandcasting foundry and a grey iron foundry together with very complete machining facilities. For sizeable facilities, this plant would be one of the

firm: AZ A long established heavy machine shop with about 16,000 sq. ft. space. Have reputation for careful work. Equipment Have reputation for careful work. Equipment such as large planers, Lucas boring mill and other much-needed equipment for defense Would like to get work which includes work.

risembly, if possible. Open shop.

Firm: H1 Midwest firm is equipped fer fast, precision grinding work with following equipment:—No. 3 Bryant semi-automatic equipment:—No. 3 Bryant semi-automatic internal grinders - hydraulic - capacity 6" chucking, 2" length of piece: No. 2 Cincinnati centerless, 1/16" to 4-44" c.d. capacity, both infeed and through feed grinding; No. 212 Besley double end grinder, capacity—



length of piece 10". Also have several lathes, some milling capacity, drill presses, spot welders and general welding outfit, metal slotters (abrasive type), several bench grind-ers, Rockwell hardness tester and large assortment of inspection gages and instruments, with adequate skilled labor available.

Firm: H2 Manufacturer of small automotive parts—open shop—75 employees, female oper-ators and assemblers. Want punch press work for 50 ton presses and smaller automatic screw nor on the presses and smaller automatic screw machine work for No. 2 BSS and smaller; have milling, riveting, eyeleting and welding equipment for complete assemblies in brass, steel and Bakelite and job spot welding in 14-gage and lighter. Occupies only half of present building and could build higher or use more ground area as needed.

Firm: H3 Midwest firm offers experience of more than 30 years in metal stamping and die field. Has four experienced tool and die makers available for producing tools and dies for work to be run through production department. Equipment includes:—32 presses up to 65 tons, 4" stroke; 4 press brakes, 18 quage 72"; 4 spot welders; 3 horizontal shapers; 3 lathes; 2 filing machines; 1 tool arrinder: power hack any; plain milling machines. Firm: H3 Midwest firm offers experience of grinder; power hack saw; plain milling ma-chine; 4 squaring shears; 2 high speed hammers; d.c. arc welder; acetylene weld-ing outlit; 6" vertical shaper; 4 drill presses; Doall contour saw; Abrasive cut-off machine; small electric furnace, etc.

Firm: H4 Midwest plant with 60,000 sq. tt. of floor space, is at present working day shift only. Could add two night shifts. Has smit only. Could did two hight shifts. India unusually wide range of equipment includ-ing:—2 head planer, 18° table, 32° between housings, 30° bed; 10° power press brake, 8 gauge; turret lathe; 16 bench type drill presses, all sizes; 6 engine lathes; 10° 8-ga. power shear; 5 disc grinders, double end: 5 milling machines; shaper; radial drill; 5 metal cutting saw tables; 11 floor type drill presses, all sizes; 4 buffing and polishing lathes; 5 endless belt sanders; 4 swing polishing lathes; 4 pipe bending machines; 250 and 450 amp, arc welders; Heavy duty abracut-off machine; tilting band saw; 2 lete acetylene welding outfits; large complete acetylene complete acetylene weiging ounts; rarge spray booth; Also the following woodworking machinery:—2 blade, 18" joiner; 2 blade 24" planer; 15" tilt table rip saw; 38" band saw; 18" disc sander; 24" throat jig saw; 14" swing, 24" bed and 26" swing and 80" also complete nonbed woodworking lathes. Also complete non-ferrous metal foundry and equipment with 4 gas and oil burning melting furnaces; sand blast outfit; cranes; core ovens, sand sifting riddles, band saw, etc. Can do machining and finishing work to specifications, furnishing pattern work, castings, sheet metal work, stampings, assembling, etc.
Firm: H5 Manufacturer of commercial en-

graved stationery has complete engraving, as well as die stamping and art departments. Could manufacture instrument dials, embossed paper markings or light stamping jobs calling for application of inks and various

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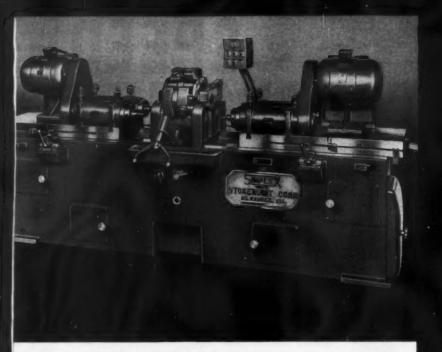
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MFD. BY TURNER UNI-DRIVE SALES DIV. TURNER MACHINERY CO.

1638 Central St., Kansas City, Mo., U.S.A.



### HIGH PRODUCTION BORING

This month we show one of the most flexible of the high production types of Simplex Precision Boring Machines, our No. 2 Unit Type Double End, Four Spindle machine. Each end is a complete, independent unit with two spindle heads, electric controls, and hydraulic feed. A trunnion type indexing fixture holds the work (propeller shaft sleeve bearings in this case) rigidly, but permits quick loading and unloading. The work is rough bored and finish bored. Simplex Unit Type Precision Boring Machines are built up from standardized spindles, tables, electrical and hydraulic controls assembled on bed units to meet each user's particular needs.

Stokerunit

549 WEST MITCHELL ST.

MILWAUKEE, WISCONS

# What's New in the Industry

#### Two New Ex-Cell-O Machines

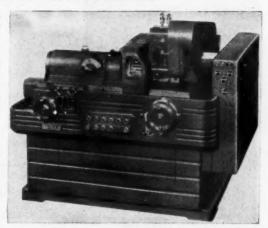
A N announcement has just been made that Ex-Cell-O Corp., Detroit, is now in production on two new products—a thread grinder and a tool grinding machine. The former—known as Style 39A—is for internally threaded work, and is automatic in operation.

It grinds threads up to 5" in length within a distance of 15½" from the work spindle nose. Maximum hole ground is 9½" with a minimum of 1". Maximum swing is 10". Taper attachment is available with this new machine that allows grinding up to

lows grinding up to maximum of 4" in diameter per foot on the effective thread length.

The 39A is one of the eight standard precision thread grinders now bearing





the Ex-Cell-O name. These various machines cover an exceptionally wide range in thread grinding work. A new complete catalog on the 39A has just been issued and will be sent on request.

The other product just announced is a new heavy duty double end tool grinder, for carbides and tools of other materials. It carries 14" wheels, and can be equipped for either dry or wet grinding. This new tool grinder—called Style 49—is the sixth and largest of the Ex-Cell-O line of carbide tool grinding machines.

### Steelweld Tapering Operations

The complete line of bending presses made by the Steelweld Machinery Division, Cleveland Crane & Engineering Co., Wickliffe, Ohio are now being furnished with a ram-tapering mechanism opening a new field of applications.

The tapering mechanism permits making conical sections as illustrated

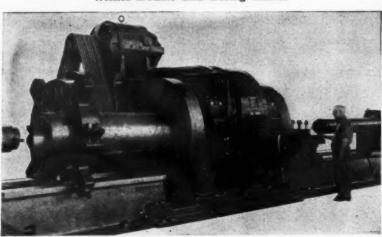


without the use of special dies. The work can now be done with standard bending dies.

Tapering the ram is extremely simple. It is only necessary to operate the ramapering lever (long lever with ball handle clearly visible in front of ram) which disengages the ram clutch. This permits operation of the right-hand ram screw only, which raises or lowers the right end of the ram, thus producing tapering. Either end of the ram can be tapered as much as ¾" per foot length of bed. There are no bolts to loosen or tighten. The ram swivels on trunnions in the slides so there is no cramping on guides or bearings.

The press is shown working steel 3/16" thick. Two of the sections being formed make the bottom of a 48" diameter bucket. This particular machine is a Steelweld Bending Press Model 14-10. It will handle plate 10 ft. by 5/16" between housings and 12 ft. by 1/4" over entire length of bed and ram.

### Wickes Double End Boring Lathes



Wickes Brothers, Sazinaw, Mich., announce a new line of double end boring lathes. Illustration shows a 30"x25'x25'

unit designed for boring hollow steel forgings such as torpedo air flasks and guns.



No reduction in the cost of tools could be enough to overcome inferior performance. Fortunately, Molybdenum high speed steels, which cost less than the Tungsten types, combine lower purchase price with equal performance.

Users know that improved cutting

properties, better toughness and lower cost progressively bring about tool cost reduction.

It will pay you to call in your supplier for the analysis and heat treatment of the Molybdenum high speed steel that is most suitable for your cutting and cost requirements.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • CALCIUM MOLYBDATE

# Climate y on m wampany 500 First e Track City

# HYBCO TAP GRINDER

If you can't get delivery on New Taps why not get real life and service out of your old ones?



The HYBCO Tap Grinder-for sharpening Chamfer, Flutes and Spiral Points. Series 600 has a capacity from No. 2 to % Hand Taps. Series 700 No. 4 to 1 Hand Taps. Chamfer controlled by adjusting screw in head. Special Heads for Left Hand Taps can be supplied. Reasonable Deliveries.

Write for Descriptive Bulletin No. H.B.

### HENRY P. BOGGIS & CO.

210 ST. CLAIR AVE. - CLEVELAND. O.

This machine has a 30" hollow spindle and 25' length of bed on either end. Each end of bed is equipped with a 12"x20' forged steel boring bar, for boring the hollow forgings from both ends simultaneously. The machine is arranged with independent feed box on each end, driven by a variable speed d.c. motor, with power rapid traverse. The main drive motor is 50 h.p., variable speed, with 3 mechanical speed changes in headstock.

The forged steel work-piece is supported in, and driven by face plates on either side of center drive headstock, and also supported in the 4-jaw steadyrests. A portable spotting carriage is provided for preliminary work on end

of forging.

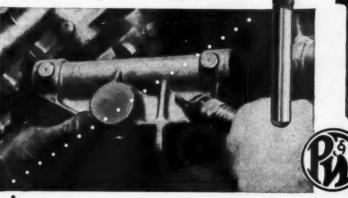
Net weight of the lathe, with electrical equipment is 183,000 lbs.

#### Hanna Portable Hydraulic Riveter Is Flexible

A new portable hydraulic riveter is announced by the Hanna Engineering Works, 1772 Elston Ave., Chicago. This new machine is said to employ a unique suspension method which permits unusual versatility of position.



# KELLER FILE CUT BURS



### · bite into tough steel forgings

If you finish hard, tough metals such as the alloy steel forging shown above, use file cut burs. Your cuts will be clean, smooth and accurate, and your burs will last longer. When a bur designed for softer materials is used on these hard metals, there is a tendency to "bounce" over the surface. Cutting is uneven, producing unnecessary wear on the teeth.

You won't be troubled with "bouncing" if you use Keller File Cut Burs... particularly adapted for use on hard metals. Their sharp teeth literally bite in... they have the stamina to stand up under long, severe service. Write for the Keller Bur Catalog... it shows burs of every conceivable size, shape and cut.

Headquarters for the Finest Flexible Shaft Equipment

## PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO

WEST HARTFORD, CONN.

Kellerflex Sales Department



Combines all advantages of the old style "C" clamp plus swift toggle action. When released, entire lower half of clamp swings clear of the work.

Two adjustable rods permit holding work at exactly desired spot. Will hold many types of work not possible with ordinary "C" clamps.

Now made in 6° size only. Withstands clamping pressure of over one thousand pounds.

TWO MODELS:—No. 255 as illustrated has screw type, threaded rods; No. 256 is exactly the same except holding rods are ½\* standard, amooth rods, for use in are walding where sparks might otherwise damage the threads on the screw type rods.

PRICES:—\$5.00 per clamp, f. o. b. Detroit. Unless otherwise requested Clamp No. 258 (threaded holding rods) will be shipped. Write for price on lots of twalve or more clamps. Mail your order direct to:

DETROIT STAMPING CO.

In this "twist-proof" Hanna, there are no hoses to retard the operator in rotating the rivete; upon its suspension axis or getting from one rivet to another.

Essential safety features permit operator to reverse stroke instantaneously and automatically prevent repeat strokes.

Pressure exerted by the riveting die may be regulated by simply turning the tonnage control dial. Recommended pressures for driving various diameters of rivets and types of heads are embodied in instruction plate. The riveter automatically adjusts itself to variations in thickness of work being riveted—die changes are unnecessary.

The Hanna Portable Hydraulic Riveter is actuated by a high pressure pump. There are no pressure generators, boosters or solenoid valves to maintain—no electrical connections between riveter and power unit.

This new unit has a capacity of 17½ tons ram pressure, 3" ram stroke. It will drive \%" rivet cold, \%" hot. Power unit is self-contained and includes a 2 h.p. motor to drive the high pressure pump. Yokes are available to meet a wide variety of conditions.

### Fray Develops New Model

The new No. 7-B Milling Machine is a product of the Fray Machine Tool Co., Glendale, Cal. Column, table, knee and saddle of this machine are of the same material and size as their standard No. 7 Milling Machine. Head on the No. 7-B is of the ram type. Movement of ram is controlled by a feed screw op-erated by means of a ball crank with positive jaw clutch to prevent accidental movement. Feed screw is fitted with a 3" dial with .001" calibrations so milling head can be accurately given an in and out movement above the By setting turret head at any desired angle, it is also possible to perform angular machining operations by means of the ball crank controlling the ram.

All parts comprising the complete turret head are of the same substantial proportions as the No. 7.

Longitudinal travel of table is 12"; turret cross slide travel, 10"; combined VERSATILITY

Three tools in one, Router, Carver, Shaper. A machine made to do just one of these jobs would cost much more and not have the would cost much more and not have the router. Speed and Smoothness of this vertex of the party of the pattern for rough or invaluable to the pattern for rough or smooth work for the party's desiring a smooth work for the party's desiring a router or shaper. Cutting is smoothly and router or shaper.

Power unit is a custom built G. E. Universal Motor delivering over 1200 watts and equipped with Heavy Duty Sealed Precision Type Ball Bearings. A safety type said point is used. The Motor is so well universal joint is used. The toughest as designed that it will do the toughest as well as the most delicate work required. Frame and table are of heavy grey iron, Frame and table are of heavy grey iron, and table are of heavy grey iron, work. The carefully machined for precision work. The initial investment and operating cost are very low.









#### CARVER

The length of the Carve Spindle makes it possible to get into almost impossible shots to clean up patterns, to true edges, to take care of heavy roughing out work for irregular patterns or to do the lighter work which may be necessary. Speed and power mean clean cutting performances and lessen sanding time.

#### SHAPER

To secure efficiency in shaping it is necessary that you have a powerful, well balanced power unit. Duro's G. E. designed unit delivers 1200 watts at the spindle, ample power for the toughest work with or against the grain. The use of sharp cutters on this 20,000 R. P. M. Motor gives such clean cutting that sanding is not necessary.

#### ROUTER

Whether you wish to rout through the entire thickness of the wood, or to a specific depth in a block, you will get a smooth clean job. The special design of the spindle and chuck permits router bits to be held close to the front bearing. Chuck capacity from ¼ to ½. Collets permit ¼°, ½°, collets permit ¼°, ½°, and ½° shank bits.

### DURO METAL PRODUCTS CO.

2649 N. KILDARE AVE.

DEPT. BB-20

CHICAGO, ILL.

# "Stark",

"ELECTROBLAST"

No. 2 Full Muffle Type Furnace



High grade insulated Furnace. Silicon Carbide Muffle 7s,49s,534,6. Complete with built in blower ready to run, \$1.58. Blast actuated by powerful Universal bull bearing motor. May be had as a Hydrogen Braxing Furnace complete with Pyrometer as illustrated, \$256. Unit will reach 23500F. in less than an hour at 10c per hour. Indispensable for small intermittent jobs. Write for descriptive literature.

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862

Waltham, Mass.



### "FULL SPEED AHEAD" REQUIRES BEST LIGHT

Increased night work ... faster production unvarying accuracy ... all demand VIMCOLIGHT'S localized, high intensity illumination. Black & Decker's Valve Refact provides this important aid to "steppedup" operations. Increase YOUR machine output with Vimcolight ... adjustable, nonglare, low-in-cost. Write us !

### VIMCOLIGHT

VIMCO MANUFACTURING CO.

table and turret cross slide travel, 22". Cross feed travel of table is 7"; ram travel (in and out), 10"; ram cross travel on turret head, 10"; vertical travel of knee is 12"; spindle travel of head, 3\(\frac{1}{2}\). Maximum distance spindle to table is 14"; maximum distance spindle to column, 15"; size of table is 7\(\frac{1}{2}\)" x29"; turret head is calibrated 360°. Taper in spindle, No. 7 B. & S.; No. 2 Morse Optional. Dials 3" dia., are calibrated in one-thousandths (.001".) 200 divisions. Head wheel feed is calibrated in one-thousandths (.001".) 50 divisions Weight complete is 1515 lbs. Motor, \(\frac{1}{2}\) h.p. Fray "All-Angle"; Hand lever feed; positive quill lock. Quill graduated in one-sixteenths of an inch.



All feed screws are mounted in radial thrust ball bearings. Feed screw nuts are of Ampco Metal; castings, Meehanite G. C.; table stops calibrated in one-thousandths.

Welding Electrode Handbook

A revised, twenty page handbook of welding electrodes and accessories may be obtained free of charge by writing Hobart Brothers Co., Box EW-79, Troy, Ohio.



## \* DEFENSE

FOR YOUR DIAMOND TOOLS...MEANS MORE DIAMOND TOOLS FOR

### **DEFENSE!**

INSIST ON THE GENUINE

abrasine DIAMOND TOOLS

### TERRITORIES AVAILABLE

Sharply increased demand for our products necessitates expansion of sales staff. Attractive proposition for high-caliber representatives. Write details of experience, territory, etc., in confidence. Address: Sales Manager.

Look for the RED BAND of Proved Performance!

ABRASIVE DRESSING TOOL COMPANY . DETROIT, MICH.

# SAVE PRODUCTION TIME



Save hours on centering work on lathes, grinders, millers, etc.



Three interchangeable Male and Female inserts permit use with all kinds of centered and uncentered work.

- Permits heavier loads at higher speeds.
- Precision built; all parts hardened and ground.

#### IDEAL BALANCING WAYS.



- Simplify balancing crankshafts, pulleys, flywhoels, etc.
- \* No leveling or set-up required.
- Precision ball bearings Work carried on free turning special steel discs.
- Adjustable for different length work.

### TOP Loss and Mistakes with

### Universal METAL ETCHER

Permanently marks identification on all smooth-surfaced tools, dies, metal



Four etching heats. Ground clamp for large work.

IDEAL Electric Marker



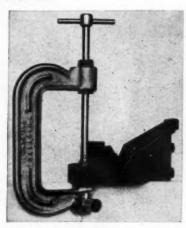
permanently marks All Materials; used like a pencil.

### IDEAL COMMUTATOR DRESSER CO.

1441 Park Ave., Sycamore, Illinois In Canada: Irving Smith, Lal., Montreal, Quebec

### **Twistite Ground Clamp**

Elimination of ground clamp failure is one of many claims for the new Twistite Ground Clamp, offered by Michigan Clamp Co., Box 243, Jackson. Mich.



This clamp combines the quick adjustment feature of Twistite C Clamps with a spatter proof treatment on the frame, pressure rod and swivel foot.

The swivel foot turns on a ball bearing which is asserted to prevent slippage on any surface, assuring a positive ground.

The stationary foot, to which the ground cable is attached is insulated from the frame. The manufacturer claims this feature extends the life of this clamp and a solder lug is provided to hold the welding cable.

### "Ryerson Steel Pictorial"

An interesting photogravure publication has just been issued by Joseph T. Ryerson & Son, Inc., Chicago. The third in a series, the current "Ryerson Steel Pictorial" features the problem of steel procurement, with suggestions to the individual user. It also contains pictures and editorial matter on the government's "Training - within-Industry" plan and its functioning.



# for Users of AIR and HYDRAULIC POWER

Production executives, maintenance men, plant engineers... this new bulletin will prove mighty helpful to you, now, when you're striving to make production keep pace with demand. Its detailed drawings, concise descriptions and complete me-



HOPAK VALVES—2-, 3- and 4-way, result in precision control of air or hydraulic equipment. They're at their best when teamed up with NOPAK Cylinders.

chanical data on the entire line of NOPAK Cylinders can help you make the most effective use of Air and Hydraulic power in a wide variety of applications throughout your plant. Incidentally, it brings you up to date on recent NOPAK developments in cylinder design and performance. Your request for Bulletin 82 on your company stationery will receive our immediate attention.

GALLAND-HENNING MFG. CO. 2754 5. 31st Street Milwaukee, Wisconsin

Representatives in Principal Cities

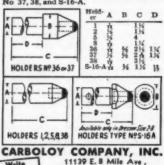
VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE



You get prompt deliveries when you order Carboloy diamond impregnated wheel dressers. You also eliminate all diamond losses and all remounting exenses. Use them on your rough, semifinish and finish dressing operations.

Mounted Free in Desired Holder, Standard Holders shown below, Special Types when needed, Allow 1 Week—10 days for holders No 37, 38, and S-16-A.



Write

FOR CATALOG DR-100

Detroit, Michigan Chicago, Cleveland, Los Ang Newark, Philadelphia, Pittsburgh, Worcester, Mass.

Diamond Impregnated ARBOLOY WHEEL DRESSERS

### **Handy Storage Cabinet**

With defense plants operating in several shifts, a real need has arisen for tool and part storage facilities. An at-



tractive and useful cabinet of drawers recently has been introduced by Standard Pressed Steel Co. It is of sturdy steel construction, and provides indi-vidual drawers for employees to keep their tools and other equipment safe. Cabinets can be made with any number of drawers . . . Drawer sizes 20" x 20" x 6". Can be supplied with cylinder locks or provisions for padlocks. The cabinet shown stands 52" high.

### "Lightnin" Mixer Bulletins

Three bulletins on "Lightnin" mixing equipment are offered by the Mixing Equipment Co., Inc., 1807 Garson Ave., Rochester, N. Y. These mixers have a wide variety of uses in the chemical, petroleum, processing, and other industries.

Bulletin B-65 covers the portable mixers, which feature a no-wrench booklet Another describes their nozzle mounting top entering mixers, and a third treats side entering mixers.



# LOGAN ENGINEERING CO., CHICAGO, ILLINOIS



### THE METAL INDUSTRY'S

### **BIGGEST DEFENSE MANEUVERS!**

PHILADELPHIA, OCTOBER 20-24



The entire metal industry is pooling its knowledge of defense production and conservation at the 1941 Metal Congress & Exposition in Philadelphia, October 20-24.

Under direct request of many manufacturers a comprehensive program of group meetings on Defense Problems, Conservation and Substitution has been prepared. These group meetings are not to be of the ordinary round-table type where everything is left to chance but are to be wellplanned presentations.

A representative will present at each meeting the latest information on the scarce materials involved in the clinic and the status of substitute materials, also indicating how industry can assist in and adjust itself to the present shortages. Since meetings will be "off-the-record" men of industry will be free to discuss actual production problems and quote examples.

Subjects to be discussed include alloy steels, stainless, molybdenum, tool steels . . . alloy castings . . . bearing metals . . . shells . . . aluminum . . . magnesium . . . copper . . . inspection of metals . . . priorities. etc.

In addition to these afternoon and evening clinic meetings, more than 80 technical papers will be presented at regular annual meetings of the four technical societies who cooperate in the Metal Congress.

And—at the Metal Exposition—the exhibits of 300 leading manufacturers in the metal industry (largest show ever held) will feature the latest, most modern materials, equipment, and processes for speeding production.

Don't miss the opportunity of hearing the nation's leading defense experts in Philadelphia—your defense job demands representation at the Metal Congress & Exposition!

#### COOPERATING SOCIETIES

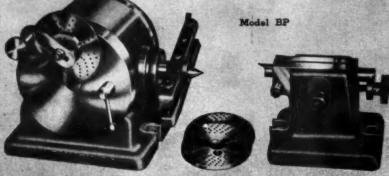
American Welding Society. Wire Association. American Society for Metals. Iron & Steel Division and Institute of Metals Division, American Institute of Mining & Metallurgical Engineers.

Address: W. H. Eisenman, Secretary, American Society for Metals, 7322 Euclid Ave., Cleveland, Ohio.



# .W DIVIDING HEADS

Astonishingly low priced, but high in quality, these new L-W 11\* Universal Dividing heads give the utmost in accuracy at a cost lower than any similar piece of equipment on the market. Ruggedly built, constructed with many new features which increase their accuracy and their use for practical, profitable shop operation.



HEADSTOCK—New, ruggedly designed for maximum rigidity. Can be swiveled to an engle.

TAILSTOCK-New design, heavier and stronger.

HEADSTOCK SPINDLE—Tapered bearings, bored for No. 10 B. & S. taper. Increased diameter and length. Threaded nose 24\* diameter 10 thread USS.

WORM—Made from special alloy steel, accurately finished, end thrust taken by ball bearings. Means are provided to make adjustment of worm wheel easily and accurately.

WORM WHEEL.—Large diameter, 40:1 ratio, accurately generated, securely mounted on spindle.

EQUIPMENT—% table slot tongues, three index plates are furnished, dividing all numbers to 50, and even numbers to 100, with the exeption of 96 T. The Index chart furnished gives all divisions obtainable to 380.

MODEL BP FOR PLAIN MILLING MACHINE

\$128.55

MODEL AU—FULL UNI-VERSAL FOR COMPLETE INDEXING AND SPIRAL CUTTING

\$194.65

L-W CHUCK CO.

1-7 N. ST. CLAIR ST.,

TOLEDO, OHIO

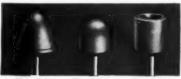
# ACCESSORIES

• That's right, and here's how: The Handee line is the most complete ever offered to fit stems to add to their usefulness and versatility. Look over the cross section shown here, you to do some special job faster and better—how a hundred of them save precious time your fingertips. Most items can be shipped promptly. Send for catalog.



#### CHICAGO MOUNTED WHEEL SET No. 3

A popular selection of 15 of the most practical shapes and sizes.



No. A-4 WHEEL Mounted on " mandrel. 78c

No. A-21 WHEEL Mounted on 34" mandrel.

No. A-38 WHEEL Mounted on " mandrel. 45c

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STEEL CUTTER on 34 shank 25c

STEEL CUTTER on 36 shank 85e

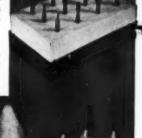
No. RF-219 No. RF-152 STEEL STEEL CUTTER CUTTER on 34 on 34 shank shank \$2,50 \$2.50

#### STEEL CUTTER SET No. 3041

12 selected Cutters mounted on 34" steel shanks. \$9.00

### No. 3042

12 selected Cutters mounted on 34" steel shanks. \$27.00





No. 20 SAWdiam. .033" thick. Mounted shank, 75c

3019 Cutting Disc, of rubber. diam. thick, 1/8" hole, 40c

No. 31 Polishing Tip of felt. For intricate work. Without mandrel, 20c

stiff.

No. 3050 Grinding and Polishing Kit. \$2.00



o.29 Polishing Wheel.
oft rubber. 3/6" diam.,
" thick, 1/6" hole. ithout mandrel, 20c

No. 12-S Wire Cup Cleaning Brush Cleaning on 1 m mandrel, 75c



Scratch Brush 1 diam. On A Extra diam. On å" diam. shank, 50e



No. 34 Drum Sander, 1/4 "x1/2" drum on 1/2" shank, 75c No. 49 Wire Brush diam. \$1.00

### YOUR

to fit all portable power tools—300 different stock here. Consider how this or that one will enable hime and give you a storehouse of efficiency at

### CHICAGO

OF V/T SUPER BOND

This remarkable new bond is the talk of the industry, because wheels made from it actually have 150% to 300% longer life than ordinary wheels. Ask for a free wheel to make your own test-you'll be amazed with results.

#### PRECISION DRILL PRESS



Here's a sensitive press in which the DeLuxe Model Handee can be mounted and held firm to drill holes from 1/a" in diameter to the very smallest. Sturdy work table measures 31/2" in Without diameter. Handee \$15.50.

### TOOL POST ADAPTER

No shop should be without the De-Luxe Model Handee in one of these convenient Post Adapters. For



grinding small holes and as a help-out unit on any standard lathe, it just can't be beat. Adjustments for accurate set-up rigidly held. \$2.50.

### 64-PAGE CATALOG

Send for illustrated catalog covering the entire line of Chicago Wheel Products.



Has perfect balance. Will drive a  $2\frac{1}{2}$  diam. wheel smoothly, at a speed of 17,000 r.p.m. Weighs 3 lbs. Comes in wood case with 3 Chicago Mounted Wheels, Drum Sander and Bands, 2 Collets, Wrenches, Dressing Stones, \$38.50.

### USES 1001

"Caesar" of The little power tools. Uses 300 accessories to grind, drill, polish, cut, rout, carve, sand, saw, sharpen, engrave, etc. Plugs in AC or DC socket. Speed 25,000 r.p.m. Weighs 12 oz. 18.50 postpaid with 7 accessories.

### IMMEDIATE DELIVERY

Order on 10 Days, Money-Back Trial Send for either model today and try it for 10 days in your own plant on your own work.

### CHICAGO WHEEL & MFG. (U.

Makers of Quality Products for 40 Years 1101 W. MONROE ST., DEPT. HB, CHICAGO, ILL. Canadian Distributers: Canadian Trade Corp., Ltd., 1332 Williams St., Montreal

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54   Fr	end ree	Hi-Pow Wheel.	Size	*********	DeLux	Handes
37						

Address

# DRIVE ALL MOTORIZING UNIT



Brackets to fit all machines up to IOHP carried in stock, also Special Units for Brown & Sharpe Automatics.

(PATENTS GRANTED)

MANUFACTURING CO.

3400 Conner Ave. DETROIT-MICH.

# If it's HIGHER PRODUCTION you want on tapping or drilling . . .

you can get it with an

# Ettco-Emrick MULTIPLE TAPPING

or DRILLING HEAD . . .

a s and you can get it quickly and at low cost because these heads are made up entirely of stock parts "tailored to fit" your specific requirements.

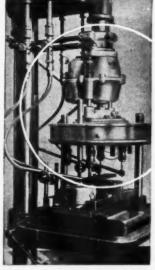
You simply send us a drawing or sample part giving necessary tapping or drilling data. Our engineers, with some 25 years of specialized experience to guide them, figure out the best way to handle the job and work out a gear case assembly of standard gears, spindles and chucks arranged to do the job.

IF IT'S A TAPPING JOB—This gear case assembly comes to you bolted to a standard Ettco-Emrick centrally driven and reversing friction clutch and face plate driving unit, like the one illustrated, with a taper shank to fit your drill press spindle.

IF IT'S A DRILLING JOB—The gear case assembly is bolted to a standard Ettco-Emrick ball-bearing face plate driving unit with a taper shank to fit your drill press.

NOW GET THIS—All gear cases are interchangeable on the tapping and drilling face plate units. Hence, one tapping and one drilling face plate unit will take care of the gear case assemblies for any number of different jobs and you can change from one job to another in a few minutes.

BULLETIN No. 3 gives you the whole story about this production-boosting, money-saving system. Write for a copy—today.



QUILL CLAMPS can be furnished for fastening heads rigidly to any drill press.

# ETTCO TOOL CO.

596 Johnson Ave., Brooklyn, N. Y.
CHICAGO

The famous Prick DRILL CHUCKS • TAP HOLDING CHUCKS

TAPPING ATTACHMENTS • TAPPING MACHINES

MULTIPLE SPINDLE TAPPING AND DRILLING HEADS

Unexcelled for Design, Materials and Workmanship



BETTER
PRODUCTION

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LONGER
LIFE

The Most
FOR YOUR
MONEY

# MARSHALLTOWN PRESSES

When you buy a Marshalltown Press, you get a press that is designed and built for extreme dependability, and a press that is an outstanding value. Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven advantages.

Write today for literature about Marshalltown Presses—available in capacites from 5 to 70 tons.

MARSHALLTOWN MFG. CO. 900 E. NEVADA ST., MARSHALLTOWN, IOWA

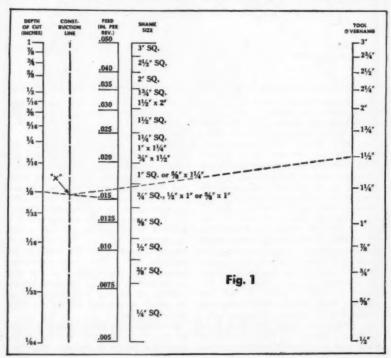
# "Let's Talk Shop!"

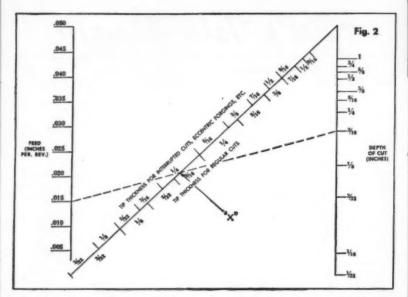
### Selecting Carbide Tool Shank and Tip Sizes

By Paul H. Miller, Carboloy Co., Inc. .

OVER the past decade a good deal has been said about using heavy shanks and rigid setups in order to get the lowest possible part costs when machining with carbide tools. These general statements have been given rather widely varying interpretations. For instance, some have assumed a ¾ square shank is sufficient, where oth-

ers have used a 1-¼" square shank. In order to arrive at a reasonable shank size for a job, thorough study of past experience has been made recently and the data from this experience checked with actual calculations based upon tool loads as applied while cutting. This study has been summarized in Figure 1 which shows a chart for determining shank size. The load on the tool is determined by the depth of cut and the feed. The amount of overhang determines the bending moment





which the shank must resist and therefore, in order to design a tool, it is essential that the depth of cut, the feed and the tool overhang be known. Given these three values the recommended shank size can be very easily determined from the chart shown in Figure 1. This is used as follows:

Assuming a feed of .015", a depth of cut of 1/4", and an overhang of 1-1/2", a straight edge is laid between the 1/4 shown for the depth of cut on the scale at the left of the chart and the .015" point shown on the feed scale; this line crosses a construction line which lies between these two scales. Mark the point where the scale crosses the construction line. Then join this point "X" with a point on the tool overhang scale represented by the tool overhang to be used-in this case 1-1/2". The dashed line represents the scale. The point where this line crosses the shank size line determines the recommended shank size to use. In this case it would be ¾" square" ½ x 1, or % x 1.

#### Tip Thickness

It has been shown by experience that the tip thickness required for any job cannot be accurately calculated, but a series of calculations have been made and these have been adjusted by actual experience in making up a similar nomograph on tip thickness (Figure 2). By means of this nomograph it is possible to determine quickly a safe tip thickness to use. The loading of the tip depends upon the depth of cut and the feed. Tests from experience have shown that speed does not play an important part in determining the loading on the tip and therefore can be safely eliminated in tip thickness determinations.

In order to use the nomograph shown in Figure 2, you first decide on the feed and depth of cut you are going



In industry the plain pulley had been the main drag for many years; yet upstairs in the wife's workshop there was a grooved wheel on the sewing machine since time immemorial.

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has made an extensive invasion of the power transmission field.

The Sheave Pulley transmits much more power. That's why it needs the CONWAY CLUTCH—with these extra advantages of capable performance: easy engagement, instant release, and drag-free idling.

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to use. Then locate the feed on the scale at the left-hand side (in inches per revolution), and the depth of cut (in inches) on the scale at the right hand side of the chart. Lay a straight edge between two points and read directly on the angular line, the tip thickness required. For instance. dashed line will illustrate the method used, and represent a straight edge between the feed of .015" and depth of cut of 3/16". This crosses the sloping line at "X" as shown. For an interrupted cut the tip thickness would be 1/4". For a "regular" or continuous cut, a tip thickness of 3/16" would be sufficient.

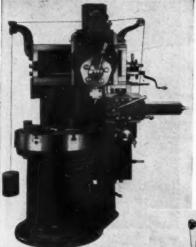
Naturally, a chart of this type will not exactly cover every condition. There are jobs where the material being cut is of a type which does not set up as heavy a stress as would be set up when machining steel or alloy irons, in which case experience has shown thinner tips can be used. Our experience, taken as a whole, indicates however that a large percentage of the tools used can be economically and safely designed using tip thickness as determined by the chart in Figure 2.

When selecting tips it is recommended that the nearest standard size be used whenever possible.

#### Test for Cracks in Crankshafts

Power presses, reognized as one of the most hazardous groups of industrial machines, are given careful periodic tests at the General Electric Company's Schenectady Works. A unique test is the magnetic test to which punch-press crankshafts are subjected.

The magnetic test consists of magnetizing the shaft, making the direc-tion of the flux longitudinal so that it will intercept any possible cracks at right angles. While magnetized, the shaft is sprayed with kerosene which has in suspension finely divided particles of magnetic iron oxide. Any cracks or discontinuities in the metal will set up magnetic poles, which, while very slight, are strong enough to attract



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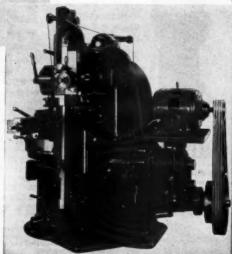
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and hold the iron - oxide particles, thereby outlining a crack which may ordinarily be invisible to the naked eye.

This test is made each time a shaft is removed from a punch-press for any reason, as a punch-press crankshaft is subjected to tremendous strain in operation. One large company recently tested a group of 43 crankshafts, using this method, and found that 14 of them were cracked and required replacement.

# Primer Body-DRILLER



A single lever operates four independent drillheads. Sellew multiple drillers and drillheads in use in U. S. Arsenals for past fifteen years.

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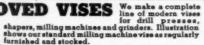


#### Mental Failures Cause Accidents

Here are a few mental failures to guard against:

PREOCCUPATION: — Letting-your-mind-wander and daydreaming are a couple of everyday names for mental failure. A man may be using the proper tool, have every guard in place and, to look at him, you'd think he was proceeding in perfect safety. But his mind is a thousand miles away. Presently something goes wrong with the routine of his job. The work jams in the machine, or he forgets to slip his goggles over his eyes. And an accident occurs.

## PLUNKET IMPROVED VISES We make a complete



In ordering this vine give size of slot in table: No. 10—6" jaws, 1½" deep. opens 5", ne. 45 lbs., \$38.00 No. 20-10" jaws, 2½" deep. opens 8½", ne. 120 lbs., \$2.00

Best material and workmenship. Prices are not f. o. b. Chicago. Dealers' inquiries are solicited. Write for folder TODAY.

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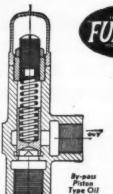


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Cast iron or brass.

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WORRY:-This is perhaps the most common mental failure of everyone. It is a lot like daydreaming. But whereas daydreaming usually is about some pleasant subject, worry is unpleasant and doubles the hazards of any job. Worry makes a man lose sleep, ruins his appetite. A person can worry himself into actual illness. Some people, wiser than most, can shut their troubles out of their minds. We all should try to do this. Worry never solved a problem.

ANGER:-Anger will upset anyone and tangle up the orderly working of his mind. For Safety's sake alone, nothing is worth getting angry about. But if you can't resist a surge of anger, stop working for a few minutes. Get mad, pop off, and then forget about it. By all means don't bottle up your fury and let it grow until it completely occupies your mind. Control your tem-

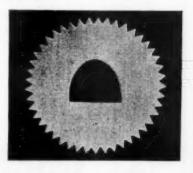
per. Talk things over.

HASTE:-Haste always makes a person impatient with the usual and safe way of doing a job. A man in a hurry

wants to cut corners, take chances, and thus flirt with accidents.
(National Safety Council News Letter)

#### Strut Patches for Aircraft

Illustrated is a treated fabric patch, which is glued around struts that hold aircraft wings rigid, to close the holes where the struts penetrate the wing covering.





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IDTH	List Price	Our Price	List Price	Our	List Price	Our Price	List Price	Our Price								
Inch	\$1.75 2.35 2.90 4.05 5.15	\$ .95 1.25 1.50 2.25 2.90	\$1.85 2.45 3.00 4.20 5.40	\$ .95 1.25 1.50 2.25 2.90	\$1.95 2.60 3.25 4.50 5.80	\$ .95 1.25 1.50 2.25 2.90	\$2.05 2.70 3.40 4.80 6.15	\$ .95 1.25 1.50 2.25 2.90	\$2.15 2.85 3.60 5.10 6.55	\$ .95 1.25 1.50 2.25 2.90	\$2.25 8.05 3.85 5.45 7.00	\$ .95 1.26 1.50 2.25 2.90	\$2,35 3,20 4,05 5,75 7,45	\$ .95 1.25 1.50 2.25 2.90	\$2.45 3.40 4.30 6.10 7.95	\$ .95 1.25 1.50 2.25 2.90

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The fabric is difficult to punch but The Acromark Corp., 259 N. Broad St., Elizabeth, N. J., has found a way to do it economically and believes that aircraft manufacturers generally may be interested.

The fabric is treated and furnished by the aircraft manufacturer in rolls, and Acromark in turn punches out the patches, 20,000 or more at a production run.

#### Midwest Issues Catalog No. 17

Midwest Tool & Mfg., Co., 2360 West Jefferson Ave., Detroit, Mich. announce a new 192 page illustrated catalog (No. 17) which contains information on metal cutting tools and holders, including counterbores, countersinks, drills, end mills of all kinds; form tools, keyway cutters, milling cutters of all types and kinds; reamers, spot facers and spot facer bars, adjustable extension holders, floating holders, and cemented carbide tipped tools in every type, design and variety.

Photographs and drawings showing the

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various kinds and types of tools and holders have identifying style numbers in conjunction with accompanying



specification and tables of sizes and dimensions. Table of feeds and speeds cutter-sharpening data, and conversion tables are also included.

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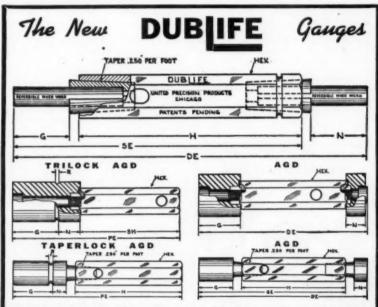
344 North Vermont Ave. Los Angeles, Calif.

#### Tantung "G" Tools in Two **New Styles**

Blades for inserted tooth milling cutters and "all-purpose" type lathe tools with full width tips, made of Tantung "G", are listed in two new bulletins from Vascolov-Ramet Corp., North Chicago, Ill.

Tantung "G" is a patented non-ferrous alloy containing tantalum carbide developed especially for "borderline" applications between the machining ranges of high-speed steel and cemented carbides. It has been found especially effective in increasing production of old machines and cutting operations where the use of cemented carbide tools is hazardous. Tantung "G" tools are also obtainable in solid tool bits and "Economy" type brazed tools.

Bulletin G-408, containing drawings, dimensions and prices of nine popular types of milling cutter blades, and Bulletin G-409, containing specifications and prices of "all-purpose" type tools, will be supplied upon request,



United Precision Products, exclusive manufacturers of Plug Gauges, announce a new improved DUBLIFE Gauge. The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plugs are reversible, so that when one end is worn the other end can be used, thus giving double life. 30,000 gauges in stock ranging from .030° to 1%

A new catalog showing DUBLIFE and AGD Gauges will be sent to those requesting it on company letterhead.

## UNITED PRECISION PRODUCTS CO.

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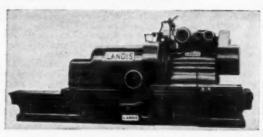
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#### Landis 25" Type D Radial Crank Grinder

A timely new Landis Tool Co. development at Waynesboro, Pa., is the 25 Type D Radial Crank Grinder. While it is a specialized machine intended just for radial crankshaft work, with the proper tooling, it is suitable for a wide variety of operations. The more common of these are:—(1) Rough grinding-pin diameters

and adjoining radii. (2) Squaring ends of center section. (3) Grinding web faces adjoining pins of center section. (4) Squaring ends of pins on both front and rear sections. (5) Grinding web faces adjoining pins on both front and rear sections. (6) Semi-finish grinding pin and adjoining radius on both front and rear sections. (7) Finish grinding pins and adjoining radii

after assembly of shaft.



pacity to handle the largest of radial cranks. Headstock is of particularly rugged design and work spindle is unusually large and hollow. This permits either long or short end of shaft to be inserted within end of spindle during finish pin grinding operations after shaft has been assembled.

A work speed of 30 or 55 r.p.m. is available on standard machine. To facilitate changing work, the design is such that work rotation will always

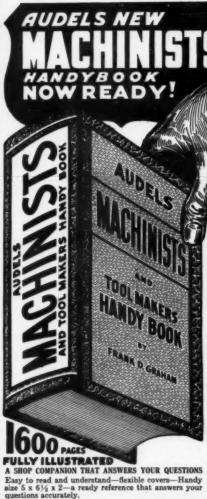




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automatically stop at the same point. The work holding fixture is equipped with a mechanical clamp and when machine is arranged for finish pin grinding operation after assembly of shaft, a dual clamping arrangement is provided.

A 42" diameter grinding wheel is used. In view of the deepness of web faces on radial cranks, this permits a large amount of wear before wheel change becomes necessary. A hydraulic straight infeed mechanism is

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used, although it does not always function in the same manner.

A convenient lever at front controls direction of feeding movement, while a nearby valve regulates speed of slow or dressing feed. Operation is further facilitated by a second valve which permits a quick shift from slow to fast feed or vice versa.

Wheel base of all these machines, excepting the ones tooled to finish grind pins after shaft assembly, is set at a 4° angle. An arrangement of this kind particularly advantageous grinding web faces. The wheel as it is fed laterally is in straight line contact with web face instead of in total contact. A much freer cutting action results with stock removal taking place more rapidly, with finish better and with web faces perfectly square.

A shoulder grinding attachment is provided on many of these machines. It permits operator to feed grinding wheel laterally, after it has been brought into grinding position, by a handwheel located at right of standard feed in handwheel. Amount of feed is adjustable and can be set for continuous duplication.

Hydraulic power is utilized to traverse work table. General control of machine has been centralized to the extent that a convenient lever, depending upon station to which it is shifted, will cause work rotation to start or stop, the work table to traverse either right or left and will jog the work. A spacing bar and plunger at front rapidly locates table in correct grinding or dressing position. When grinding pin diameters and their



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Luers Cutting Off Blades and Holders are reducing our cutting off operations by half. This tool is a combination of many good principles, and fills a long felt need in the machine shop.

We have driven these Cutting Off Blades into forged stainless steels and bar stock for hours at a time under power feed without grinding.

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Eliminate 90% of All Cutting-off Troubles with Luers Cutting-off Tools.

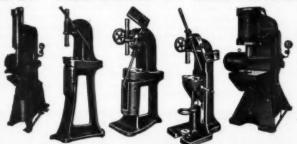
They reduce friction in 3 important ways. The tapered blade provides edequate back clearance. The T-shaped section develops less side friction. The curved chip is free to expand and does not block the cut. Other important features pictured and described in literature.

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TURRET TAILSTOCK 116.0

SPECIALTIES MANUFACTURING COMPANY INC.
ET. BLOOMFIELD, N. J.

adjoining radii before shaft is assembled, a special truing device which is mounted permanently on righthand end of table is provided to dress face of wheel and radius left-hand

corner in one operation.

A 1 h.p. work drive motor, a 3 h.p. pump drive motor and a 15 to 25 h.p. wheel drive motor are recommended. Floor space required is 8'10" x 16'0". Net weight, including electrical equipment is 22,200 pounds.

#### Speed-Wet Hand Sander

A new hand sanding device has just been marketed by Behr-Manning, Troy, N. Y. It is a new type of sanding device which fits the hand ideally and may be used for dry sanding or with water, gasoline or oil. It holds a length of abrasive paper or cloth tightly in position over a replaceable Neoprene pad.

Named the "Speed-Wet Sander" it has a magazine in which a reserve supply of abrasive paper or cloth is rolled so that once it is loaded, the workman may continue sanding for a considerable period before it is neces-



sary to reload the block with an unused portion of abrasive material. When the sanding surface becomes unsuitable for further service, the workman may pause for a moment, unfasten a clamp and pull a new sanding surface into position, tearing off the worn end. This operation is repeated when necessary until all reserve sandpaper in the magazine is used. The unit is recommended for sanding flat or slightly curved surfaces.



# for SENECA FALLS Putomatic lather WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

#### Lubricants

Sometimes a lubricant can lubricate too well, as a mideastern city reported not so long ago. A department interested in testing oils f o r lubricating municipal equipment had purchased a lubricant testing machine. Among the first materials tested was an oil suspension of "dag" colloidal graphite.

And for a while it was the last lubricant they really tested. For every oil tested thereafter gave exactly the same reading as had been obtained with the Acheson colloidal graphite.

What had happened was this: The equipment u s e d consisted fundamentally of a motor driving a shaft in a journal. When the colloidal graphite lube was under test, a "graphoid" surface — as usual had formed on the journal and

That is, the extremely fine (40 millionths of an inch) particles of graphite, under load, had been absorbed by the surface and had formed a lubricating film on these parts, integral with the surface material. Washing the parts or polishing them with abrasive wouldn't remove this film.

What was more, the graphoid film, with its natural affinity for oil, held more oil on the bearing surface than the bare metal itself could have done.





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"Full speed shead on production!" That's the demand of the day-but if you can't get GOOD MEN, how can you fulfill the

Well, one way is to eliminate "bottleneck" hand jobo-such as hand sanding I

For example, "SANDY" can do the work of three hand sanders—and give you as fine a finished sanding job as you could want . . . because "SANDY" operates at 3,000—%. strokes per minute!

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363 E. Ohio St .. Chicago, Ill. That's why so many manufacturers in all kinds of in-dustries have turned to "SANDY" to TRIPLE the speed of finish-sanding. We may be able to help you overcome bottlenecks caused by inadequate man-

power, and thereby bring about important savings in your production costs. Put "SANDY" to work in

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Please RUSH "Hints on Sanding Savings" to me at once!

Company ..... Att'n of



With a thicker film, the film rupture strength went up. So, until the film broke, the readings made the oils look that much better than they actually were.

It finally became necessary to regrind the shaft of the testing machine to remove the surface material with its adsorbed graphoid film and fit oversize bearings. It cost the city \$300 to recondition the machine before it could be used again.

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#### Machine Shop Training Books Available at Cost

A series of monographs comprising suggested unit courses in various phases of machine shop practice has been prepared by the Bureau of Industrial and Technical Education of the University of the State of New York. Designed for beginners in machine shop practice, the texts are intended for use in vocational education programs for national defense industries and were prepared in cooperation with the U. S. Office of Education. The books are all of a practical nature and concern typical shop problems.

These texts, which are in loose leaf form with spiral wire binding, cover courses in heat treatment, lathe operations, drill press work, bench work, blueprint work, measurement, job sheets, electronics, and mathematics. The book on mathematics, the largest of the group, comprising 190 sheets, concerns itself with arithmetic applied to the machine shop and gives an unusually practical approach to the subject.

The booklets are being made available to industry at cost. Prices range from 45c. to \$1.15 for single copies, with lower unit prices where the texts are ordered in quantity. Price list may be obtained from the Greenwood Co., 49 Sheridan Ave., Albany, N. Y.

#### Two Dayton Rogers Bulletins

Two bulletins are announced by the Dayton Rogers Mfg. Co., 2830 13th Ave., South, Dept. A., Minneapolis, Minn. One covers the new improved Model D Universal Pneumatic Die Cushion. It is available with pin pressure pad custom made to fit the press bed opening.

Another bulletin describes the new, improved combination angle-plate-holocator. This device is said to be valuable in experimental shop and tool room for speedy drilling, reaming, and laying out of dies and drill jigs.

#### Scholars

A large number of national defense and post-war problems are being subjected to close analysis by members of the faculties of collegiate schools of business and economics, research institutions, and by graduate students in American universities, according to a recent announcement by the U.S. Dept. of Commerce.

These studies, covering a wide variety of subjects, are designed to develop dependable information of value to responsible government officials and others who deal with defense problems and who will face the economic readjustments which must follow the war.

The Department of Commerce is cooperating in this work by acting as a clearing house for information concerning such projects, with a view to eliminating duplication and enfurther couraging

studies in currently important fields. Foreign as well as domestic problems are covered, several studies being in progress on wartime conditions in Great Britain, Russia, and Germany, and a smaller number on conditions in Canada, Japan, and Latin America.

They include methods of price control, priorities and rationing, financing of defense production, the effect of war on living conditions, etc. Still other research projects cover the economic organization of the totalitarian coun-



he MILBURN

901 HENRY STREET . DETROIT, MICHIGAN

tries, their self-sufficiency in food products, and the position of labor in such countries.

A brief outline is available describing 123 research projects reported to the Department of Commerce, the names of the persons conducting the research, the institution with which they are connected, and the tentative date of completion of the study.

Copies of the complete list can be obtained from the Department of Commerce or any of its field offices.

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Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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#### Gorton Munitions Engraver

To ease the strain of producing standard engraving machines, the George Gorton Machine Co., Racine, Wis., has developed a stripped-down machine especially for defense work. This machine, designated as the Model M-E Munitions Engraver, is now in production.



Both the standard and munitions engravers are being used in defense work to engrave or profile such parts as:—gun range scales, indicator plates, gun barrels, airplane propeller pump housings, range finder bands, gun sight dials, gun elevation scales, air temp dials and

### You Need A Tote Pan

Durable - Liquid tight - 5 gallon capacity - pressed from 1/16 sheet steel - 21-1/2\*x13-1/4\*x5-1/4" x 5-1/4" inside.



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R. B. ANNIS COMPANY INDIANAPOLIS, IND. many other parts for guns, planes, ships, tanks, bombs, shells, torpedoes and other armament needs.

It is explained that by eliminating many of the controls and adjustments necessary to give standard machines their versatility, production of the Model M-E can be tripled. This is done without sacrificing accuracy and without impairing the Munitions Engraver's ability to handle the work for which it is designed.

Simplification has been achieved by an improved spindle drive, which does away with several parts and assembly operations, and by providing the Model M-E with a fixed pantograph reduction ratio. (Standard machines permit reductions ranging from 2:1 to 40:1). Further savings in both materials and labor result from having a table which is only adjustable vertically. This is to provide for differences in the height of work.

Stock tools and accessories used with the standard engraving machines are used equally well in the Munitions Engraver, making it unnecessary to buy any special tools, with the possible exception of work holding fixtures.

Catalog by Modern Collet
A new catalog is offered by the
Modern Collet & Machine Co., 403
Salliotte St., Ecorse, Mich. This spirally
bound booklet (Catalog No. 40) describes and lists Modern products. They
include:—spring collets, feed fingers,
pusher tubes, alloy steel cams, and
other perishable parts or tools for leading makes of screw machines. The
manufacturers also call attention to
their facilities for the complete rebuilding and modernizing of screw machines.

## Rotary Files

These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can grind it.

The Rotary File Co.



#### Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or skatch.

This service is designed especially for your convenience, for which we make no charge.

STRATFORD, CONNECTICUT

#### Diamonds

The place of diamonds in the national defense program is outlined in an interesting bulletin issued by J. K. Smit & Sons. Inc., 157 Chambers St., New York, N. Y. Known as the August, 1941, is-sue of "Diamonds in Industry," this folder lists the following as major applications of industrial dia monds:

1. Single - point tools for finishboring work on precision boring machines.

2. Special pointed tools for use in gages.

3. Special points for hardness test-

4. Dressing and truing tools for gear grinding and spline grinding machines.

5. Dressing and truing tools for precision thread grinders.

6. Dressing and truing tools for

centerless grinders when employed for the automatic grinding of work requiring stepped and profile wheels.

7. Diamond pointed tools for special honing operations.

It is stated that for precision boring it is the general practice to rough-cut with a cemented carbide tool then finish with the diamond. This procedure takes advantage of the best properties of both types of tool materials-the ability of cemented carbides to remove a relatively large amount of metal at high speeds and feeds, and the property of the diamond tool to produce a sur-



face finish of high polish and smoothness with a remarkable degree of dimensional accuracy. This practice is said to make it possible to meet the

exacting surface finish specifications of the aircraft industry.

The effectiveness of diamonds as dressing and truing tools is vital. It is pointed out that they are basic to the success of such important precision tools as thread grinders, gear grinders, and spline grinders. Machines capable of special profile grinding set-ups also emphasize the significance of diamond dressing and truing.

#### The New Campbell "Cutamatic" Model 401

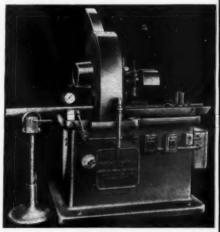
A new cutting-off machine is announced by the Andrew C. Campbell Division. Known as the Model 401 "Cutamatic," it is reported to employ a new principle of abrasive cutting, viz.—the shorter the arc of contact, the more efficient the cutting action.

It is asserted that the principle makes it possible for this wet abrasive cu ting machine economically to cut steel bars as large as 6" in diameter, the largest size material that has been cut abrasively, taking approximately 10 or 15 seconds to the square inch of cutting. With many types of abrasive machines 2" diameter is the pracical limit. This shorter arc of contact is effected through the combination oscillating and rotating movement of the hydraulically fed abrasive cutting wheel. Oscillating movement of the ma-

chine can be regulated and adapted to particular sizes and shapes of materials.

The manufacturer declares that a distinctly new method of coolant application not only removes difficulties usually encountered but also helps to produce a straighter cut and assures longer, more even wheel wear.

Explanation of coolant application: The work remains in a fixed position in the work holder, and as the thin abrasive wheel revolves, it passes through a supply of liquid coolant. By its own speed, the disc collects the



proper amount of liquid coolant and directs it against and into the cut being made. Due to the peculiar oscillating motion of the wheel in relation to the work, an opening is provided at all times at the point where the wheel contacts the work and the coolant is forced into this opening so that it comes intimately into contact between the cutting edge of the abrasive wheel and the work being cut.

Equal distribution of coolant to both sides of the wheel is said to insure equal temperature on both sides. This



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New ELKONITE TIP pencil. New Baby Grand Model at a lower price.

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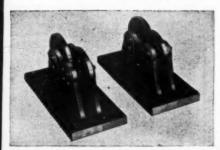
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## In the race against time you're a sure winner with

# Anderson





# PILLOW BLOCK BALANCING WAYS

Suited for large diameter work, as a subbase can be made of proper height to give necessary clearance. Built in 1000, 2000, 5000, 10,000 and 20,000 capacities. Precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings.

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# ENATIONAL

demands conservation of tools and the existing shortage of taps makes this ALCO TAP HOLDER your one best bet for economical, uninterrupted production.

Adjustable concentric alignment—no broken taps to renew Even wear on taps assures longer tap life Elimination of bushings saves bushing costs Simplicity of adjustment permits time saving in changing tap sizes—change overs—and set up.



Standardize on ALCO for every drilling, tapping, reaming, and thread cutting requirement.

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is important for maintenance of a flat surface on the face of the wheel. Grit and dust laden air is overcome by the new method of applying the coolant.

Fast, flat cuts are claimed for this new "Cutamatic." Both hard and soft materials are cut. In cases where materials are used for forging purposes or where annealing is unnecessary except for the cutting-off operation, materials can be purchased unannealed.

#### Lewis Semi-Finished

#### BENCH MILL

A PRECISION MILL AT A SENSIBLE PRICE!

Ideal for many uses. All major machining operations finished to high degree of accuracy. Perfectly designed, shop-tested, trouble-proof construction. Exceptionally efficient. Stands se-



verest service. Handles full range mailing work. Table 3½ \*1.8\*, travel 12\*, cross feed 5½\*, vertical 7\*, No. 3 Morse Taper in spindle. 3½\* center hele adaptable for colletatachment, Complete \_\_including materials, blueprints and LEWIS 60 UN TERS NAFT castings.

Send today for new 1942 Catalog.

#### LEWIS MACHINE TOOL COMPANY

P.O. Box 116, Sta. A, Dept. Z-10

Los Angeles, Cal.

#### Manual on Metal Inspection

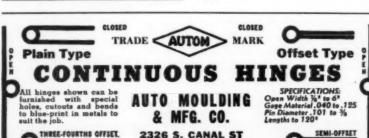
A new book, described as a most complete manual on the inspection of metals, and written by a recognized authority in the metallurgical field to fill a definite need of the defense program is announced.

"Inspection of Metals" is by Harry B. Pulsifer, metallurgical engineer with the American Metal Treating Co., and consulting metallurgist with the Ferry Cap and Set Screw Co., of Cleveland; formerly assistant professor of metallurgy, Lehigh University.

Included among the topics covered by the book are: — "Ideals in Steel Making"; "Surface Inspection"; "Tensile Testing Including Shear"; "Microscopic Structures and Patterns"; "Coatings and Corrosion Testing" and "Impact Fatigue and Creep Testing."

"Inspection of Metals," a strippedfor-action handbook, covering the whole field of the testing of metals for ordnance, armament and other phases of the national defense effort, contains only essentials and is written in a style comprehensible to the hastily trained emergency worker as well as the veteran metals man.

Inasmuch as the book was written and published in the interests of national defense and thore so engaged, it has been made available at the cost of production: —\$1.00, and may be obtained from the American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio.



CHICAGO

#### Powder

A new method of producing metal parts is making rapid strides in certain applications. It is known as powder metallurgy. A 1 though more than 100 years old in certain fields such as platinum goods. it has made remarkable advances in the past few years in produc-ing small parts to close limits witho u t machining. Even small gears are being so made.

This technique is also used to form combinations of metals or of metals and nonmetals. Certain types of abrasive wheels and discs. new types of porous filters, porous metal bearings, and sintered carbide cutting tools are examples of the successful application of powder metallurgy.

The process owes its origin to the fact that certain metals, such as

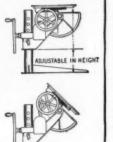
platinum and tungsten, melt at such high temperatures that it is not practicable to melt them by conventional means. It was early found, however, that platinum powder could by heavy pressure be forced into a solid form and fused into a workable ingot at several hundred degrees below the melting point. Several decades ago, the same process proved successful for making tungsten lamp filaments.

Combinations of powdered metal

\* welding economy

STARTS

with efficient handling of welding assemblies



★ After a welding assembly is once fastened to the table of a C-F Welding Positioner, the welder, without any other help, can tilt the work to any angle from horizontal to 135° beyond horizontal and he can turn it to any degree within a complete circle. This means better welds all "down hand," safer handling and faster production. Sizes from 1200 to 14000 lbs. capacity are described in our booklet WP 20. Write for your copy. It tells the complete story.

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made by this method possess peculiar and valuable properties. Instead of forming a true alloy, a combination is produced which often possesses the characteristics of the constituent metals in direct proportion to the amounts employed. Electric contacts as in circuit breakers can now be made of powdered silver or copper (for high conductivity) and powdered tungsten or molybdenum (for high melting point, thus avoiding the old problem of fusing of contacts).

# New! illerent! REED BENCH DRILL

The TYPE 25 BENCH DRILL combines streamlined efficiency, simplicity, high speed, and greater precision at lower cost. Only two castings form the base and column, assuring rugged strength. Drill chuck is the only moving part exposed. Infinite speed range from 1500 to 10,000 r.p.m. Capacity is ¼\*. Spindle travel is 3\*. Equipped with finest precision ball bearings throughout. Also floor type Drills, Polishing Machines and Greenfield Universal Tool and Cutter Grinders.

## Production Machine Co.

Greenfield.

Massachusetts

#### Portman Optical Projector

A new optical projector has been developed by the Portman Machine Tool Co., 17-19 Beechwood Ave., Mount Vernon, N. Y.



The projector is substantially constructed and is suitable for use in shop, tool room, laboratory or production departments. Objects to be measured, inspected or compared, are simply placed on the work rest member of the stage. This design feature eliminates need of numerous staging or holding fixtures.

Among the noteworthy features is utilization of the Acton optical system. This is said to permit the ready change of image magnifications.

The projector is available with plain type stage unit, or may be equipped with a coordinate type staging unit consisting of movable members for sidewise and forward travel. The Portman coordinate stage unit includes dial type indicators reading in .001" for rapid visual detection of object errors. The reflected image is projected on a clear or ground glass screen.

As but one adjustment has to be made in operating this projector, inexperienced operators may be employed for critical inspection operations. Standard magnifications available are, 10, 20, 30, 45, 60, 80 and 100.

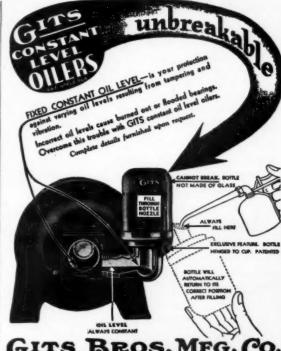
#### New Book

The "New Encyclopedia of Machine Shop Practice," a 576 page volume, is announced by Wm. H. Wise & Co., 50 W. 47th St., New York. Designed for popular use in schools, vocational courses, factory reference libraries, and especially for home study, it is offered at a popular price-\$1.98. There are nearly 1000 line drawings and an appendix containing many handy tables. Though encyclopedic i n content and copiously indexed for ready reference, the text is suitable for consecutive reading, and so read gives a good, rapid grasp of the whole field.

George W. Barnwell, Professor of Production Practice at Stevens Institute of Technology, is the authority responsible for the text. which was pre-

pared with the assistance of a score of practical experts in the respective divisions of the work. It is up-to-theminute, especially in its discussion of the metal alloys and their uses, the fast-growing applications of powder metallurgy, etc.

Included in the contents are detailed explanations of the operation of such standard machine tools as the lathe, milling machine and centerless grinder. Gear cutting, heat treatment, forge and foundry work are also covered.



ROS. MFG.

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> Methods of laying out work in the shop, blueprint reading, the construction, theory and use of the micrometer. as well as various types of gages and the principle of working to limits, also are clearly detailed.

> The "New Encyclopedia of Machine Shop Practice" is available as a reference in connection with vocational training. It covers such machine tool operations as turret and automatic lathe work, thread - cutting, taper - turning, broaching, etc.

#### ARMGLO

Manufacturers of Resistance Welders—Foot, Motor, Air and Hydraulic operated.

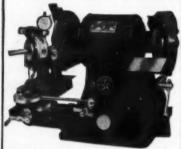
Standard and for specific applications with and without electric timing control.

Bench type filing and sawing machines and abrasive band finishing machines.

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Milwaukee, Wisconsin

## Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect points on standard twist drills in sizes from No. 41 (.096) to % (.625).

Send today for more details.

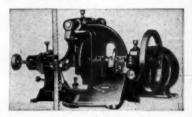
#### Star Machine & Engineering Corp.

Division Star Electric Motor Co.

Bloomfield, - - New Jersey

#### Black Diamond Saw Filing Machine

Band saw filing and setting machines, circular saw and knife grinders, saw guides, and band saw blades are covered in a new bulletin announced by Black Diamond Saw & Machine Works, Inc., Natick, Mass.



The band saw filing and setting machines are quickly adjustable to any particular saw. The machine then operates automatically. It sets the teeth, then files each tooth with slim taper or taper files, the same as used in hand filing.

This machine is offered in both bench and floor types for either belt or motor drive. The machine is built in three sizes. They handle saws in the following width ranges:—1/16 to 1½", 1/16 to 2½", and ½ to 4½".

#### Bonderizing Large Metal Enclosures

Facilities to bonderize large metal enclosures for switchgear and electrical control have recently been put into service at the East Pittsburgh Westinghouse works. Result is a reduction in handling of these units and a large saving in time required for the bonderizing process.

Formerly the enclosures had to be bonderized in sections and then welded together. The welding operation destroyed the bonderized surface making a very unsatisfactory paint base. Reversing the sequence has eliminated this undesirable feature and has also saved much time and handling in the manufacture of these units.

#### **Cutting Tools**

Two orders affecting the production and delivery of cutting tools have been issued by the Priorities Division, Office of Production Management.

S u p p l e-mentary Order E-2 - a supplements a n d supersedes General P r e f - erence Order E-2, the original order imposing priority control on distribution of cutting tools.

The new order. unlike the original, permits the acceptance a n d filling of non-defense orders, provided that pro-duction and deliveries of defense orders are not prejudiced. It covers regular, as well as special cutting tools, and assigns a preference rating of A-10 to all defense orders to which a higher rating has not been specific-

ally assigned, and requires that deliveries of these tools be made in accordance with preference ratings.

To enable a distributor to obtain stocks of cutting tools the order assigns the A-10 rating to deliveries to him for the purpose of filling defense orders, and permits him to obtain these tools prior to having defense orders on his books. Tools so acquired however must be held to fill defense orders.

The second order on cutting tools, Preference Rating Order P-18-a, supersedes Order P-18. It is a limited

MACHINE TOOL BLUE BOOK



blanket rating order issued to manufacturers of cutting tools, assigning an A-1-a rating to certain listed materials to enable them to manufacture cutting tools required to fill defense orders, but limited to these. The previous order applied to non-defense orders also.

The materials to which the A-1-a rating is applicable include: — high speed, alloy, and carbon tool steel, cutting tools including cemented carbides; abrasives; measuring instruments and gages; and maintenance and shop supplies with certain restrictions.



# TO INSTRUCT NEW MEN IN THE HANDLING OF DIAMOND TOOLS

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KOEBEL DIAMOND TOOL CO. 9352 Grinnell Ave., Detroit

#### KAEBELITE DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for all Industrial Purposes.

#### **Electric Thickness Gage**

A new type of electric gage is designed for measuring the wall thicknesses of hollow, aluminum propellers.

The instrument is applicable also to the thickness measurement of any non-magnetic metal when only one side is accessible, even if the nonmagnetic metal is backed up by a magnetic metal. Thicknesses up to 1½", depending upon the electrical resistivity of the metal, can be measured within an accuracy of five per cent.

Brass sheeting copper tanks, and large pipes lend themselves to the use of the gage. One instrument has been placed in service in an airplane propeller factory and two in rolling mills producing brass products.

The gage consists essentially of a bridge circuit, voltage - amplifying equipment and an indicating instrument. The bridge circuit comprises two inductances with U-shaped cores and a differential transformer. The inductances serve as a gage head and an adjustable balancing head.

The gage head, when placed against a nonmagnetic metal, sets up eddy cur-

# TANNEWITZ High Speed METAL CUTTING BAND SAWS

Fastest and best known means of cutting sheet steel aluminum and magnesium sprues, gates, risers, and kindred items.

Provides sawblade travel of over 2-miles per minute with PERFECT SAFETY. Cuts are exceptionally smooth.

Write for Metal Cutting Band Saw Bulletin

THE TANNEWITZ WORKS



# "PENCILPOINT" DIAMONDS

# FOR TRUING GRINDING WHFFIS





These diamond tools are regular equipment in the grinding of broaches, form milling cutters, ground taps, punches, dies, etc. Send us your inquiries: or blue print of wheel outline for our recommendations. Some of the diamonds are cut to form: others are natural shapes, best adapted to the purpose.

> For full information write F. F. Gilmore & Co.

F. F. GILMORE & CO. 112 DARTMOUTH ST. BOSTON, MASS.



Modern precision machine shops and inspection departments will find this sturdy 36'x 48 MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, provided with cross ribs every 101/4" for rigidity, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30°. Shipping weight 1200 lbs.



We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS 165 SO. BARCLAY ST.

MILWAUKEE.

#### MOREY No. 12M High Speed Vertical Profiler and Miller

Production of interchangeable parts requiring milling of any contour or outline can be materially speeded up by this Profiling and Milling Machine.

Ask for Circular No. 680-A



Morey Machinery Co., Inc.





rents within the metal which change the impedance of the head and affect the circuit bridge balance. The eddy currents increase with the thicknesses of the metal.

The effects of these eddy currents upon the circuit bridge, as shown by deflection of the indicating scale, are plotted upon a master curve for known thicknesses of a specific metal within the desired thickness range.

The gage head then is placed against the unknown thickness of that same metal and the scale deflection read. This reading is compared with a similar point on the master curve to determine the thickness of the tested piece. It is essential that the contour of the test piece be the same as that of the pieces of known thicknesses from which the master curve was obtained.

The higher the electrical resistivity of the metal the greater the thickness that can be measured. Within this gage which operates on 50- to 60-cycle alternating current, brass, which has a comparatively high resistivity, can be measured in thicknesses up to 1½", whereas copper, which has a low resistivity, can be measured only to 1½" thickness.

The gage head, encased in bakelite, can be held in one hand for application against the metal. The remainder of the gage is contained in a steel carrying case and weighs about 30 lbs.

#### Research

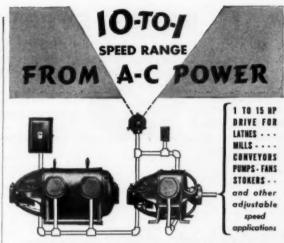
The great importance of scientific research to the defense program and to the public at large is given official recognition in an order signed by E. R. Stettinius Jr., Director of Priorities. It grants the high priority rating of A-2 to equipment needed by research laboratories.

The Priorities
Division has obtained the assistance of the National Academy
of Sciences. The
Academy will advise upon applications from laboratories for assistance under the
new plan.

A laboratory experiencing difficulty in securing essential materials, and wishing to qualify for the A-2 rating, should apply to the Chemical Branch, Office of Production Management, Wash-

ington, D. C., on Form PD-88. It may be readily obtained from that office.

The preference rating may be extended as far as necessary to assure ultimate delivery of scarce materials to the leboratory. A laboratory, when applying for the rating, should specify the number of copies of the order necessary to enable its suppliers to serve them upon their own sub-suppliers. Extensions of the rating to suppliers will be made not by the Priorities Division but must be done by the laboratory itself.



Here's the new, low-cost way to get adjustable speed, constant torque drive from a-c power. The Westinghouse Adjustable Speed A-C Drive provides instant speed adjustment from 175 rpm to 1,750 rpm for continuous operation—slower speeds for starting or setup. No exciters, clutches or complicated control. Push button starts or stops the drive—a single rheostat controls the speed. Nothing else to buy. Write for bulletin DD-4063. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Dept. 7-N.

J-21171



If the laboratory is unable to obtain some essential material with the A-2 rating, it should file application on Form PD-1 for a higher rating. If the research project is deemed of sufficient importance, the Priorities Division will issue an individual preference rating certificate, assigning a higher rating to a particular delivery.

Some 2,000 research laboratories in the U. S. use small quantities of about 5,000 chemicals. They use 25,000 different instruments.

# BENDS EVERYTHING! "MICRO" DIE DUPLICATING BENDER NO. 1

Angle — Channel — Rod — Round or Square Tube — Round, Half-Round, Square or Flat Wire and Strip Stock.

TWO-WAY OPERATION-right or left. It's a money-saving die substitute.

> Write for circular -"Metal Duplicating Without Dies"

O'NEIL-IRWIN MFG. CO. 314 - 8th Ave. So., Minneapolis, Minn.

#### Ampco Issues Two New Bulletins

Ampco Metal, Inc., Milwaukee has just issued two bulletins-one entitled Ampco Metal in Machine Tools," the other "Ampco Metal in Dies."

These bulletins are each of six pages. letterhead size, so folded and trimmed as to be inserted easily in a binder. Each bulletin is well illustrated with photographs of parts and applications. Each covers specifically the subject matter under discussion.

"Ampco Metal in Dies" tells how Ampco Grades 20, 21, and 22 are largely used in forming and drawing dies. The bulletin points out the qualifications of this alloy of the aluminum bronze class for die service. Reference is also made to the use of Ampco guide pin bushings which do not gall nor seize-have great wear resistance-and eliminate rusting entirely. These guide pin bushings are stocked by Ampco.

"Ampco Metal in Machine Tools" de-

scribes the widespread use of Ampco Metal by the machine tool industry. The bulletin shows why one large manufacturer in the field uses Ampco Metal in 65 applications and another finds the alloy desirable for 54 places in its line of tools. Among the physical properties of Ampco Metal which appeal to machine tool manufacturers are controlled hardness, high tensile strength, great resistance to wear, impact, and fatigue. and excellent compressive strength. The bulletin also contains a list of typical machine tool applications.

Copies of these bulletins will be sent to interested engineers and metallurgists on request.

#### Greenerd Arbor Press Catalog

Catalog 38 is announced by the Greenerd Arbor Press Co., Nashua, N. H. It describes most of their hand and hydraulic operated arbor presses. Models offered range from small bench models up to hydraulic presses of 30 tons pressure.

#### AN INEXPENSIVE ABRASIVE BAND GRINDER



#### "Built Like A Machine Tool"

The Hormel-M Grinder is stardily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite labelication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.

96 Warren St., New York, N. Y.

#### Strikes

From time to time the public is faced with the problem of strikes and their relation to defense work. Many will be interested in the position taken by the Chamber of Commerce of the United States, which was set forth recently in a public address by Mr. Albert W. Hawkes, president of that body.

Mr. Hawkes declared: "It is important now to point out that although practically everyone in business recognizes the right of anyone to cease work or to lawfully strike, yet there is a right under our form of government which is, and must continue to be, more sacred than the right to strike. I refer to the sacred right to work. This is man's God - given right. Unless, in our free country, men and women who wish to work

can do so under peaceable conditions and without molestation—then little of our individual freedom is left.

"Our national defense preparation involves the safety and protection of everyone in the United States. If local and state authorities cannot preserve peace and cannot maintain conditions which permit those who wish to work to do so—then it becomes the first duty of the federal government to protect them in this right, by taking whatever

# SAVE VALUABLE TIME with a COVEL No. 15



Defense industries can obtain early delivery. Write, wire or phone for Bulletin 440 and name of Dealer.

#### A Precision Grinder at a Low Price!

Here's Ruggedness for production runs PLUS hand feed Control that makes the COVEL No. 15 Surface Grinder a profitable addition to any tool room and plant.



steps are necessary to insure the continuance of this defense production by those who are willing to carry it on.

"To sum up, these are fundamental rights of our citizens which must have the full protection of government: 1. The right to refuse to work. 2. The right to work in any lawful pursuit. 3. The right to the fruit of labor—security in the ownership of property. 4. The maintenance of law and order and peaceable conditions for all."

# OAGES Let Us Do Your Special Gage Work

We have every facility — adequate precision equipment and expert workers—for the quick and efficient production of all types of Gages, Special Tools, Dies, ligs and Fixtures, large or small. We have complete heat treating equipment and can handle jig boring jobs on our 18\*236\* Pratt & Whitney jig borer. Have been delivering satisfaction since 1929.

Address all inquiries to Ray W. Rice, Manager.

QUALITY TOOL & DIE CO.
401 N. Noble St., Indianapolis, Ind.

#### The "Dudco" Pump

A new, infinitely variable delivery hydraulic pump of dual vane design is said to employ a unique means of balancing the vanes so that overheating is eliminated, wear is reduced and the pump is virtually breakproof.

Known as the "Dudco" and designed for continuous operation at high pressures, it is recommended for use where the possibility of line surges requires a "breakproof" pump. Delivery is infinitely variable over two ranges; 4 to 0 gallons per minute and 8 to 0 gallons per minute.

It is adapted for continuous duty operation at 1250 lbs. p.s.i. pressures but can be used where periodic pressures run as high as 2,000 lbs. p.s.i. Increasing or decreasing the rate of delivery is by means of an adjustment screw and can be done while pump is operating.

Instead of the conventional single blade vane, dual vanes are employed. Each vane is bevelled around its entire edge so that oil from the oil hole in rotor can flow around all the edges



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SUCCESSOR In Los Householded in Tool & Machine Co.

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— Prefer Hotel Lafayette because there's always a good room available the food is excellent — the location is right in the heart of business and shopping districts.



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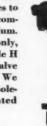
#### NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to



Style J

300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.





Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

117 OREGON STREET

WILKES-BARRE, PA.

A VERY POPULAR MACHINE FOR THE MACHINE SHOP 1/4 H. P. CAPACITY TYPE MSA





GOOD TIMES OR BAD TIMES IT PAYS TO BUY GOOD TOOLS

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#### ATTACHMENTS COVERING HUNDREDS OF OPERATIONS

WE BUILD HORIZONTAL AND VERTICAL TYPES FROM 1/4 TO 3 H. P.

HIGH QUALITY MACHINES

FLEXIBLE SHAFTS

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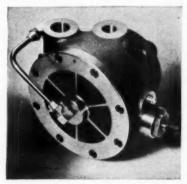


14 H. P.

of the dual vanes. The result is that a "back" pressure, variable to suit individual conditions, can be placed on the vanes from the stator side. Thus, each set of vanes is held against the stator with only a portion of the total operating pressure of the pump. The bevelling also serves to hold the vanes "centrally" with respect to the housing, thereby reducing housing wear.

Another interesting feature is the method by which the split stator is so

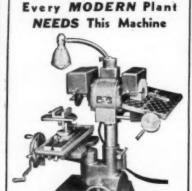
arranged that either or both halves can be moved to increase or decrease delivery rate.



Housing of pump is for flange mounting with adjustment screws at opposite sides. Intake and output connections are at top. Any oil leakage from inside of pump into outer part of housing is returned to intake through a return line. Vanes, rotor and stator halves are of hardened and ground steel as is splined drive shaft. It is made by Detroit Universal Duplicator Co., 235 St. Aubin St., Detroit, Mich.

#### Welding Electrode Handbook

A revised 20 page handbook of welding electrodes and accessories is offered by Hobart Brothers Co., Box EW-79, Troy, Ohio.



#### Universal Carbide Tool Grinder

If you employ cemented carbide tipped tools in your plant you will want to know that this machine tool performs all the necessary operations for their up-keep. If you don't—well, excuse us for wasting your time and our own.

Bulletin CTG40-8H gives you details.

K. O. Lee Company

Aberdeen, South Dakota, U. S. A.



#### NUMBERALL Numbering Machines

Automatic and Hand Operated

for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps. For Marking Metal Parts, Name Plates, Metal Checks, etc.

Write for Catalog.

NUMBERALL STAMP & TOOL CO., Ins. Huguenot Park, - - Staten Island, N. Y.

#### Safety and Defense

With the world in a social and economic turmoil without precedent in history, the safety forces of industry must face the inescapable conclusion that prevailing conditions are certain to find reflection in increasing accident hazards and mounting levels of accident frequency and severity, according to Mr. Thomas P. Kearns in a recent National Safety Council News Letter.

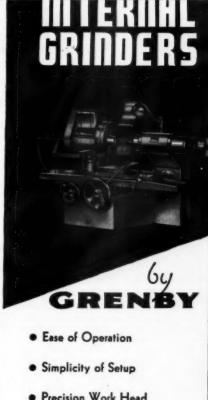
This tendency toward higher accident levels is already apparent and the maximum of productive effort for defense seems far ahead, he continues. It inevitably follows that we must face these conditions and do the best we can to keep the percentage of increase below that in manhour exposure. This is the challenge to safety organizations in every industrial plant through the state and

Heavy labor turnover is universally recognized as one of the most prolific sources of abnormal accident hazards. It brings new and inexperienced men to strange jobs, and recalls to service many whom months of idleness have rendered unskillful. Along with these conditions comes a gradual letdown in the care exercised in normal times in placing men. The critical question is, how to maintain the tempo of educational and practical safety effort in these industries to match the steadily mounting pace of production.

A working personnel engaged in production for defense is of little real value to the armed services of the nation if it is permitted to become incapacitated and robbed of its productive ability by accidental death or injury. Accidents could be just as great a menace to our peace

and security as bullets.

Under existing conditions, safety committees might find it profitable to concentrate somewhat on mental attitudes, especially the fear and worry which a war menace brings and which can be not only productive of more and more serious mishaps but also destructive of plant morale.



- Precision Work Head
- Smooth Chatterless Feed
- Variety of Holding Fixtures
- Spindle Speeds to 35,000 RPM

Send for Catalog RINVILLE, CONNECTICUT



#### Rapid Production of Small Parts Nilson Foot and Power Presses



These Presses are designed for rapic production of small parts. The operate is relieved of actual labor and his woris merely control of a semi-automatimachine.

Safety clutch is provided which about lately prevents repeating, regardless of whether or not the freadle is rejeased. By turning a handle the press is instantle converted into a continuously ranais machine.

Our No. B O Foot Press and Me. B 3 Power Press are shown. We also manufacture a No. B 3 Power Press which is larger and more powerful. Our Power Presses can be squipped with toggle leed, disl feed, or wire straightener and former.

Lat us send you complete details.

# The A. H. NILSON Machine Co.

#### Rifle Barrel Reaming Machine

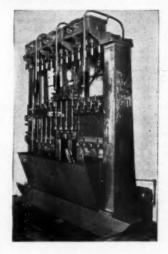
A vertical reaming machine is announced by W. M. Steele Co., 98 Beacon St., Worcester, Mass.

This vertical long hole reaming machine was designed especially for rough and finish reaming of Rifle Barrels. It is an hydraulic feed, electric controlled, semi automatic machine, arranged for either push reaming (pushing the reamer through the hole) or pull reaming (pulling the reamer thru).

The 12 spindle machine consists virtually of three 4-spindle machines mounted in a common vertical frame but entirely independent of each other in action and control. Any one of the units can be set for a different length barrel, spindle speed or feed, and can be stopped and started at will, without in any way affecting action of the other units.

The barrels (in groups of 4 each) are held on the hydraulically controlled slides by a self centering support at bottom, and a quick-acting single stroke clamping device at the top. Holding

devices can be quickly and accurately adjusted for different lengths and diameters of barrels.



#### Join The Chain Making Gang ilson Chain Making Machines

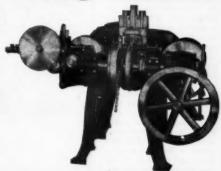
To make a full line of standard size chains as known to the trade, Nilson makes the our necessary sizes of machines. The chains made by these machines are strong, dur-tile, sale and ilexible.

t important feature of the chains those machines is that ends are a, making them perfectly smooth sides, and increasing the tensile

e smooth to handle and will hands without injury. They tely on spenckets for con-transferseion purposes.

himse for forming the , for twisting the chain, cross chain and hook.

Sand for our Bulletin today.



# IDGEPORT, CONN., U.S.A.

The reamers, driven from an oil tight gear box at top of machines, are attached to spindles, either by rigid connection or by quick-acting chuck as desired. Coolant is pumped through center of the hollow reamer shank.

Push reaming cycle includes: - 1. Pressing start button; 2. Slide carries barrels up over revolving reamers to end of the reaming stroke; 3. Reversal is obtained by slide contacting adjustable lug on control bar; 4. Rapid return to starting point and automatic stop.

The pull cycle starts with slide at top. Reamers are inserted after barrels are in place. Feeding is down and reversal up, otherwise cycle is the same as for push reaming. If desired, machine may be set to automatically stop slide at end of feed stroke for removal of the reamer. In any case, reamer revolves only during reaming stroke and stops during return stroke.

Machines are made in two sizes:-No. 1 for 30" caliber barrels - 22 to 28" long; No. 2. for .50" caliber barrels-36 to 46" long.

#### Two and Three Shift Drawer Inserts

Efficient individual storage of tools, records, or personal effects for workers on two and three shift operations is provided by Lyon's new two and three drawer units.

These units may be furnished on work benches, tool stands, shop desks, and under counters. Drawers feature easy sliding and flat key locks.

Address Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill., for catalog No. 3331-D.



#### For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading.

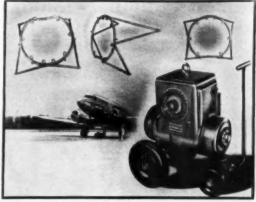
Price \$5.00 plus postage Write for folder.

J. R. Reich Manufacturing Co. Dayton, Ohio 45 E. Stroop Rd.,

#### "Aircraft Special" Arc Welder

Hobart Brothers Co., Troy, Ohio, announces an "Aircraft Special" arc welder for aircraft construction purposes. Although it embodies the same design and operating speed (only 1750 r.p.m.) as other Hobart Multi-Range Arc Welders, it has been modified to give the "quick, hot start" essential for success in welding light gage alloy tubular members in airplane construction. It also provides a lower range of welding current specified from 10 to 150 amperes at normal welding voltage.





welding of X-4130 chrome molybdenum steel on aircraft engine mounts. This type of welder has also been used successfully in a large ship yard where

## Write for Catalog WF

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files.

Learn more about these chrome Steel Files that have won a reputation for utmost precision and durability.

Ask also for catalog WM on Files for Filing Machines; catalog WR on Rotary Files and Diesinkers' Burs.

3 PARK PLACE NEW YORK CITY GROBET FILE CO. of AMERICA

stainless steel trimming bands only .030" in thickness were welded during installation of several ships' galley

equipment.

It is stated that the "Aircraft Special" welds especially well with coated electrodes of 1/32" to 5/32" size, without burning through, and with steady progress along the seam due to the "soft are" that "hangs on" even under low current conditions. Dual control of welding current and open circuit voltage enables the operator to select exactly the right volt-ampere combination for each job. Remote control, standard equipment, makes it possible for the operator to make slight heat adjustments after the "hot start" without return to welding machine.

The new welder is of the Hobart Multi-Range type with four laminated main poles and four interpoles. The machine is only 28½" high and 17" wide. (Overall measurements for sta-

tionary model).

It is a standard production Hobart unit that is furnished with convenient links for voltage changeover from 220 to 440 volts or vice versa. Machine is also supplied for 550 volts and special voltages. Models are available either stationary or portable. Portable models are obtainable with steel wheels, balloon or hard rubber tires.

**New Carboloy Grinder Bulletin** 

A new bulletin (GT-135), covering cemented carbide tool grinders has just been released by Carboloy Co., Inc., Detroit. The bulletin in addition to giving complete specifications of the various Carboloy tool grinders, also contains illustrations on adjusting grinders, methods of using grinders, and complete specifications of recommended accessories, such as wheels, special tool rests, tool blocks, etc.

Welding School Bulletin

A new pictorial booklet "You And Your Job In Arc Welding" has just been published by the Hobart Trade School, Inc., Troy, Ohio. The functions and courses of study pursued at the school are explained in this 12 page publication which may be obtained free of charge by writing the Registrar of the school.

# GROBET ROTARY FILES ground from the solid

Ask for Catalog WG

the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CO. of AMERICA . SPARK PLACE NEW YORK CITY

# NATIONAL METAL EXPOSITION

# GOES ALL-OUT FOR DEFENSE

This year's 23rd annual Metal Congress and Exposition is going "all-out" for defense — giving the nation's defense producers a chance to take stock of their progress and study new methods and equipment for speeding defense preparations.

Each morning during the week of October 20th one of the government's leading executives will address the Metal Congress on defense progress and requirements in Army, Navy, Aircraft and civilian production. During the afternoon and evening sessions of the Congress, round-table discussions on the most important phases of armament production will be headed by armament experts.

These important sessions will attract thousands of "big-guns" in national defense pro-

duction to Philadelphia's Public Auditoriums where more than 275 manufacturers will display their products at the Metal Exposition.

If you have a new aid to production . . . a better metal . . . a more efficient machine . . . a speedier way to process and fabricate metals . . . you should plan to sell the 20 billion dollar metal industry through an exhibit in its biggest annual event.

Advance reservations are the heaviest in history, however, choice locations are still available at the regular \$1.00 a square foot rate, so write, telephone or wire collect today for floor plan and full particulars. Address: W. H. Eisenman, Secretary, American Society for Metals, 7322 Euclid Avenue, Cleveland, Ohio.

#### Cooperating Societies

American Society for Metals Wire Association American Welding Society
Institute of Metals & Iron and Steel Divisions of American Institute of
Mining and Metallurgical Engineers



#### Work-Holder for Gang-Chucking

Hydra-Grip is a new hydraulic work - holder for gang-chucking operations, recently introduced by Hydra, Inc., 417 S. Hill St., Los Angeles, Cal. The attachment has interchangeable collets that hold 10 pieces of work in accurate alignment for precision machining, on milling machines, shapers,

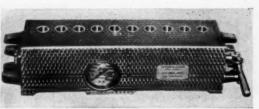
grinders or drill presses. Work is dropped into the collets and a few strokes of the hydraulic pump handle bring the controlled pressure to any

point up to 4000 pounds.

Use of this attachment is claimed to reduce loading and unloading time to a minimum and make possible the machining of 10 pieces at a time. Align-ment and height tolerances are held to standard specifications for precision work. The output of machine tools is multiplied and machines are released for additional jobs with lower costs for machine shop operations.

Collets are available in a full range of sizes from 1/4 to 11/4", by thirty-seconds, to hold round, square, or hexagonal stock. Special sizes or shapes are available on request. The controlled wrapping action of the collets is said to afford tight grip on all 10 pieces, and the equalized hydraulic pressure holds all pieces uniformly, regardless of variations in size, within normal limits. Accurate control of pressure makes this attachment particularly suitable for holding thin-walled or easily distorted work.

The Hydra-Grip is self-contained, without outside lines or connections, and in no way changes normal machining practice. The attachment is 29" long, 51/2" wide and 6" high, and weighs 125 pounds. The housing is high quality Meehanite, normalized to minimize distortion. Collets are of special steel. ground to close tolerances. Chevron packings are used throughout to insure against pressure leakage.



You can stop the excessive breakage of those taps with NoSep Lubricant



Many American Metal workers have learned that this lubricant greatly lengthens the life of their taps and other cutting tools in operations on hard steels. Its pigments

The long list of successful metal workers who use NoSep Lubricant is the best proof of its efficiency.

PROTEX NON-RUST OILS, DRAWING COMPOUNDS & ALUMINUM LUBRICANTS,

Write us for further information and/ or samples.

# TIME-OIL-WORKY



No guesowork-bearing failures waste - idle machine time - oilsoaked motor windings\_fire and accident hazards, when you modernize with TRICO OILERS. There's a type for every appliextion.

WRITE FOR BULLETINS.

TRICO FUSE MFG. CO. Milwaukee Wisconsin

#### Hydraulic Vise Speeds Production

A new hydraulic vise is said to offer considerable saving in time and labor. Capable of developing pressures up to 5 tons between jaws, it is designed to speed up small press and cutting operations, as well as ordinary vise work, and is understood to have wide application on production lines, in tool rooms, and for maintenance.

It is operated entirely by foot control, permitting use of both hands in setting up and removing work. The unit is self-sufficient—no out-

side power is needed.

Pressure to close jaws is controlled by a foot pump arrangement in a pedestal mounted on floor. The latter is connected with the vise proper by a steel tube which carries the hydraulic fluid to a ram behind back jaw and thus moves it forward. Front jaw is stationary.

Stepping on one pedal moves vise jaw to contact against work. A second pedal applies pressure up to 5 tons. A third pedal releases jaw.

Some of the different types of jobs for which it is adapted include:—press work, punching, bending, cutting, straightening, testing, and stamping. Because operator can use both hands, exceptionally heavy work can be handled and with a high degree of precision. Also due to pressure exerted, certain special work can be handled.

The vise mounts horizontally on any type of bench, as well as vertically on wall or post. In addition, it can be



mounted on a portable stand, as a movable, self-contained unit. Special



#### First Manufacturer of Adjustable Limit Snap Gages in U. S.

Plug Gages—Adjustable Limit Snap Gages Adequate stock ready to grind to special specifications Priced on Cost—not on Demand

JAS. CLARK 143-17TH AVENUE, PATERSON, N. J.

Successor to

Jaz. Clark Jr. Pneumatic Tool Co. and American Gage Co.



# A CLAMP for Every Purpose



Forged Steel Quick Acting Deep Reach Welders





Sizes Available: 34" to 10' opening 12" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co.,

1945 WAVERLY AVE., CINCINNATI, OHIO

## GRINDING WHEEL DRESSERS—VISES

We manufacture the only complete line of Grinding Wheel Dressers and cutters and will gladly suggest the proper one for your wheels.



Desmond Heavy-Duty Dresser

The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



Simplex Machinists' Vise



Desmond Diamo-Carbo Dresser, best tool room dresser.

Write for catalog H showing complete line of Desmond Dressers and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Canadian Desmend-Stephan Mfg. Co., Ltd.-Hamilton, Ont.

jaw faces can be applied.

Other features of operation include the speed which saves time and labor. absence of a protruding handle, force centered in jaws and not under them. accurate work due to precision fit of jaws, and the fact that it mounts as a fixture on drilling machine, shaper, miller, or grinder.

Construction is all semi-steel. The hydraulic pump is precision fitted. Sliding jaw and base are accurately machined. Pump and Ram cylinders are honed and polished.

Two sizes are available, viz., 5" width between jaws and 71/2" width.

A new bulletin is available from Studebaker Machine Co., 9 So. Clinton St., Chicago.

#### Combination Universal Coil Winders

Combination Universal Coil Winder is offered by The Globe Tool



& Engineering Co., Dayton, Ohio. allows high-speed winding, driven

#### MODEL NO. 16 "SPECIAL

Constructed as per Specifications of U. S. Naval Aircraft Factories



Boware of Imitations?

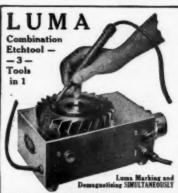
BUTTERFLY FILING and SAWING MACHINE

(Die Meking Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just Our machine carries the as well. This type of machine is usually

adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models-Model D-10° Table; Model No. L-12ª Table.

HARVEY MANUFACTURING CORP. 161 Grand St., **New York** Phone: CAnal 6-5170



Writes on hardened steel - demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details-5-day FREE TRIAL OFFER!

Luma Electric Equipment Co. Dept. H-Main P. O. Box 132, Toledo, Ohio

# The Punch That Knocks Out Two Days Work in One!

Because of their power and capacity range, simple construction and fine balance, the W. A. Whitney punches will enable you to do more work than heretofore.

There's a type and size for every requirement.





Tinners No. 4 B, shown left, punches ¼\* hole in 16 gauge iron. No. 6 Skylight Ventilating, and tank Flange model, shown above, punches ¼\* hole through 3/16\* iron.

May we send you our complete catalog?

## W. A. WHITNEY MANUFACTURING CO.

ROCKFORD

ILLINOI



Grind Your Drills On
"BLACK DIAMOND"

LACK DIAMOND"

Precision Drill Grinder



Even an unskilled operator can do a precision job of drill grinding—handles sizes from No. 60 wire gauge to 3/4"—easily, quickly and without any complicated adjustments. Saves time, drills and possible damage to the work.

Let us send you Bulletin No. 121-H.

BLACK DIAMOND SAW & MACHINE WORKS, INC.

# New Britain UNIVERSAL VISE



NEW BRITAIN TOOL & MFG. CO. NEW BRITAIN, CONN., U. S. A.

## Only \$138.50 Buys This



#### **GREAVES REAMER DRIVE**

- Cuts reaming time in half
- Assures smooth, accurate holes
- Complete with motor & foot switch
- · Capacity up to 11/2"

Write for circular

GREAVES MACHINE TOOL CO.

CINCINNATI, OHIO

through back gear arrangement. Selection between these may be made by shifting a lever on the gear head.

A pedal synchronizes control of brake, motor switch and variable speed. In this manner, simple control of speed through either of the speed ranges is obtained uniformly accelerating from start through an infinite number of steps to top speed or any desired intermediate speed.

A turn counter, up to 10,000 is provided and may be set to stop the winder automatically on any desired number of turns. When this predetermined number of turns has been wound, the counter through a solenoid and suitable linkages returns speed control to zero; turns off motor switch, and applies brake.

The machine accommodates wire sizes from No. 40 to as large as No. 8, winding coils as large as 8" in diameter and 8" long, at speeds up to 5000 r.p.m.

Direct-drive and back-gear models are available when the combination is not required. A full line of Semi-Automatic Coil Winders, and also Two and Four-Pole Armature Winders is offered.

#### Bulletin on Wells Metal Cutting Band Saw

Wells Mfg. Corp., Three Rivers, Mich., announce a bulletin on their metal cutting band saw. Three speeds may be used, making it adaptable to the cutting of most metals, including steel. Specifications are given for the two sizes in which this machine is offered.

#### Bulletin on Diamond Wheel Dressers

Dia-Tool, Inc., 320 Yonkers Ave., Yonkers, N. Y., offers a bulletin on their line of Diamond Wheel Dressers. They are offered in a variety of sizes and shapes, both multiple and single point. Matrices are either sintered carbide or brass, as desired. Several standard Heald, Norton, Cincinnati, and other holders are available at no extra cost. Special holders can also be supplied.





## HART'S Divided Machine Vises

These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The Jaws are tool steel and hardened, the angle holding the work down on the table.

Size of Base	5x7	inches
Size of Jaw	3x6	inches
Height at highest Point	21/4	inches

When writing for descriptive circular kindly mention the BLUE BOOK.

#### HART MACHINE CO.

26 Mather Street, - Dorchester, Boston, Mass.

#### HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—34\* to 4\*.







DANLY SERVICE

9 Danly Branch Stocks Provide 24-Hour Service for 95% of Ali Metal Fabricating Plants.

DANLY MACHINE SPECIALTIES, INC. 2100 SOUTH 52nd AVENUE - CHICAGO

MILWAUKEE - LONG ISLAND CITY, N. Y. - DAYTON DETROIT - ROCHESTER - CLEVELAND - PHILA-DELPHA - DUCOMMUN METALS & SUPPLY CO., LOS ANGELES, CALIF., CABONICS

SAN FRANCISCO, CALIF. NI DI

All Die Makers' Supplies Precision Dowel Pins Commercial Sets Special Sets Die Sets

# -GEARS-

Spur — Helical — Worm — Bevel — Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St., Cleveland, Ohio

#### Hild Portable Vacuum Machines

Two portable vacuum machines are offered by the Hild Floor Machine Co., 1313 W. Randolph St., Chicago. These machines may be used for countless purposes, especially when aided by special attachments. A few uses are:
—blowing or sucking dirt from motors, machines, etc., cleaning overhead beams, cleaning pipes, walls, etc.



The Model 21 "All-purpose" is designed for either wet or dry pickup work. It is engineered to move a large volume of air at high speed and is recommended for all-around general utility work. It is reported to move 210 cubic feet per minute.

The 8,000 r.p.m. motor is rated at ½ h.p. but is said to stand a constant load of 1½ h.p. Standard hose is 10 ft. long, but a 15 ft. hose of smaller diameter can be supplied if machine is to be used principally for upholstery cleaning and dust control. Overall height is 36" and weight 85 lbs.

The new Model 25 "Hushed Hild" illustrated is said to be virtually noiseless, and is designed for applications where silent operation is desired. It may be used for dry or semi-wet pickup work.

#### Unit Heater Catalog

Because the heavy demands of National Defense are imposing a terrific burden on operating equipment, the quality construction of Ilg Unit Heat-

#### ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND, N. Y.

#### MULTIPLE HEADS



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

> All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles



# COLMONOY FURNACE WELDING for HIGH PRODUCTION PARTS-

Such as Centerless Grinder Rests

This method consists of applying a casting of COLMONOY NO. 6 alloy to a steel base, by a furnace bonding process requiring no additional bonding material. One of the advantages of this process is its adaptability

to high production parts, or intricate parts inaccessible for torch application.

COLMONOY NO. 6 is effecting substantial savings on machine tool parts subject to great wear and abrasion-lathe points, dogs, chip breakers, drill flutes, wire straightening shoes, thrust bearings, screw machine fingers, forming and drawing edges, etc.

COLMONOY may be cast or applied as an overlay, using gas or electric welding equipment.

WRITE FOR CATALOG

#### WALL-COLMONOY CORP.

Sixth Floor, Buhl Bldg., Detroit, Mich. NEW YORK TULSA 538 W. 54th St. 200 Mideo Bidg. WHITTIER, CALIF. 123 W. Philodelphia St. ges. BLASDELL, M. Y. 21 Samera St. CHICAGO 625 W. Jackson Wei

A Midget in SIZE



GIANT for WORK!

#### THE WONDER CUTTER

Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to % inch round or % inch square and band iron up to % by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts of same length on both wire or band iron. FREE TRIAL in your own shop. Write for further information and prices.

The Federal Foundry Supply Co. 4602 East 78st St., Cleveland, Ohio

"TRU-V" BLOCKS



Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in five husky sizes:— 4°, 5°, 6°, 8° and 10°. Each block is carefully machined on all sides, with close limits held within .001° where required. A machined ledge on both sides provides for clamping on machine bed.

Let us send descriptive bulletin. Or contact your mill supply dealer.

Oliver Motorcraft Corp. 2532 S. Wabash Ave., Chicago, Ill. ers is featured in a new 36-page catalog No. 141, just issued by Ilg Electric Ventilating Co., Chicago.

Around the catalog is a bright yellow band headed "Check up for the Speed Up," leading the reader into a "Check-Chart." On the back of the band, the National Defense story is further developed under the heading "Sissy Heaters Can't Take 3 Shifts a Day" and warns prospects not to risk break-downs during the national emergency.

Inside the catalog is a colorful presentation of the advantages of unit heaters over radiators and steam coils for heating the "vital zones" where people work, shop and play.

Helpful engineering data, including tables, illustrations pointing out the proper location of units in various types of buildings, piping diagrams, etc. fill the remaining pages.

#### Whitman & Barnes Issue Catalog

Whitman & Barnes, 2108 West Fort St., Detroit, Mich., announces a new catalog No. 97.

New from cover to cover, it contains 166 pages, illustrating and listing all types of drills, reamers, counterbores, screw extractors, interchangeable punches, etc. manufactured by this company.

In addition it includes much valuable information pertaining to the design, construction, use and care of drills and reamers.

MODERNIZE PRESENT EQUIPMENT



Russell Boring Bar bores %18" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO. Middletown, Ohio



Shown above: Sutton Feeder and Draw-in Collet

#### SUTTON TOOL COMPANY

2895 W. Grand Blvd..

Detroit, Mich. **Accessories for Screw Machines** 

#### RECRUITS

for your screw machine

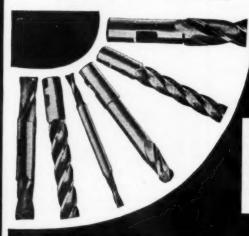
#### BRIGADE

Sutton Feeders (with longlife spring tension)

Sutton Collets (the only collets with Diamond Serrations)

Ask for Complete Catalog





Shear Cut -High Speed

# END MILLS

Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO. 2345 WOLCOTT ST.,

FERNDALE, MICHIGAN



- Stainless Steel
  Stainless Steel
  Galvanized Sheet
  Monel
  Molybdenum
  Tantalum
  Nichrome
  Tin Plate
- CopperNickelSilver
- SilverGold, etc.

There is an EISLER WELDER for every purpose.

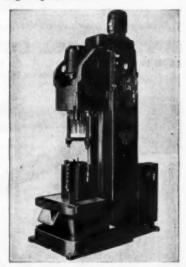
Butt Welders to weld from .010" to ½" dia. metal. We make all kinds of Standard & Special TRANSFORMERS A. C. ARC WELDERS—100 to 400 Amps. LARCE or SMALL QUANITITY CONTRACT SPOT WELDING.

FOR INFORMATION WRITE TO

CHAS. EISLER
EISLER ENGINEERING CO.
752 So. 13 St. near Avon Ave., Newark, N. J

## Holemaster Drilling—Boring Machines

These new units, arranged with hydraulic feed, are electrically operated and controlled and are built in a complete range of sizes from 5 to 30 h.p. capacity of standardized machine elements. Yet the elements may be arranged in various combinations and almost any type of machine may be built. Should the work be changed after machines have been installed, the user may rearrange the machine elements, completely changing the machines from one type to another. As an illustration, a machine may be changed from one using a fixed center cluster box to a single spindle driller.



Lower section of column encloses counterweight. Openings are provided for adding or removing auxiliary counterweights. Upper section of column forms oil reservoir for hydraulic system.

Neck is of heavy cast iron construction, provided with two changes of speed and neutral, through a clutch actuated by an external lever on right



#### **OUR PROMPT DELIVERIES** ARE HELPING TO SPEED

#### THE DEFENSE PROGRAM

JACKSON Vertical and Horizontal High Speed

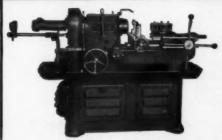
#### MILLING MACHINES

A new plant with increased facilities has made it possible for us to accept a limited number of orders for prompt shipment. High Grade in every respect and especially designed for High Speed Precision and Production Milling and Boring.

Wire, Phone or Write

Jackson Machine & Tool Company Sales Division JACKSON, MICHIGAN





SPEEDS from

CAPACITY

No. 2G 90 to 1800 R.P.M.

180 to 3600 R.P.M. Ask for Balletin No. 629 60 to 2100 R.P.M.

100 to 3600 R.P.M. 1"x61/2" turning length 11/2"x9" turning length

# No. 2G & No. 3

Motor Drive Infinite Spindle Speeds

Any spindle speed you wanta direct reading dial shows when you've got it.

Permits the use of carbide tools for fast cutting.

Turret clamps and unclamps automatically.

Equally effective on second operation and chucking work.

**Broome Street** New York, N.Y. side. Neutral position permits stopping drive shaft rotation for set-up purposes.

Change gears are of the pick-off type, mounted on splined shafts, located at front upper portion of neck. Various drive shaft speeds are available. vertical mounted motor drives both hydraulic pressure pump and head drive shaft. The pump is driven at direct motor speed through a flexible coupling. The head drive shaft, which is a splined sliding shaft is driven through a chain of spur gears. Gearing in neck is all anti-friction bearing mounted. Entire gearing in neck is supplied with lubricating oil by cascade lubrication system. A vane type pump is used. provided with a metallic filter. The neck also encloses and carries the counterweight chain rollers, mounted on needle type roller bearings.

Where change of speed is not desired, a column housing is provided. This carries counterweight chain rollers, mounted on needle type roller bearings. On top of housing is a vertical mounted foot type motor which drives the hydraulic pressure pump direct at motor speed. When such a housing is used, an additional motor is required to drive the multi-spindle cluster box.

The Single Speed Driller involves a head, arranged with one spindle mounted in two precision ball bearings with Morse Taper and knockout slot. High pressure grease lubrication is provided on this type of head.

Multiple spindle boxes for these machines are of fixed center gear driven construction and are designed for in-







dividual requirements of customer.

Using semi-automatic hydraulic feed, operator starts the head cycle by pressing a single push button. The hyraulic control valve working in connection with trip dogs located on right hand side of head, controls movement head after cycle is started. The length of rapid traverse and feed are adjusted by setting valve trip-dogs. The back or stop position is adjustable in same manner. In case of an emergency, pressing the push button station will start head in rapid reverse. When the starting position is reached, head automatically stops. Additional lengths of stroke may be had at an additional charge.

Two independent feed control units provide adjustable rates of feed forward. Either of these may increase or decrease its speed without affecting the other. Feed rate adjustment may be adjusted to suit the work.

Standard units are furnished with the following cycle: - Rapid Traverse forward, first feed, second feed, rapid reverse to the starting position and stop. A jump feed may also be furnished if desired. It provides a second rapid traversé stroke and provides:rapid traverse forward, feed forward. rapid traverse to starting position and stop, or rapid traverse forward, first second feed forward. feed ward, rapid reverse to the starting position and stop. A delayed reverse may also be furnished if desired. This provides a dwell at end of feeding stroke and is used for accurate facing to depth operations.

Standard electrical equipment is for 220 or 440 volt, 50 or 60 cycles. Equipment for other current characteristics may be furnished at an additional charge.

Coolant is provided as an extra, being supplied by a gusher motor driven centrifugal pump. This pump may be provided with an automatic shut-off at end of feeding stroke.

These units are made by the Bradford Machine Tool Co., Cincinnati, Ohio.



#### A New Compass for Metal Scribing

A beam compass with a patented rack and gear control is offered by A. P. Bartusch, 775 Walnut St., Lockport, N. Y. It is well adapted to layout work on metal or other materials. The steel scriber may be taken out when desired and replaced by any other tool, such as knife, glass-cutter, or pencil.

To use, tighten the centerpin holder (left) and propel geared roller to desired radius and tighten thumb screw. Radius is adjustable between

1¼" and 34", with extensions available. It is asserted that the positive rack and gear action prevents slipping and allows work to very close limits.

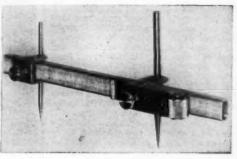
A thumb screw permits locking the beam in position when desired. Holder parts are nickel silver. Beams are made from hard aluminum alloy tubing and anodized to a satin finish.

Stuart Cutting Oil Handbook

A new 48 page booklet titled "The Straight Line of Metal Working Efficiency" is announced by D. A. Stuart Oil Co., 2727-2753 S. Troy St., Chicago. This comprehensive handbook discusses the subject of metal cutting lubricants and recommends the solutions to many tough application problems.

A few of the many interesting subjects discussed are:—the color of sulphurized cutting oils, deep drilling, broaching, thread cutting, quenching

and tempering oils.



#### "Salute! Mr. Norton"

A rather elaborate booklet has just been published celebrating the completion of the 25,000th Norton grinding machine. It is titled — "Salute! Mr. Norton" in honor of Charles H. Norton, the inventor (now 89 years old) who designed and built the first Norton grinding machine 41 years ago.

This interesting booklet outlines the history of Norton machine production and indicates its relation to the economic life of the era. There are also many intimate snapshots of life at the Norton plant, with notes on various social activities. Norton training courses are mentioned. There are also a few remarks on the great increase is productivity which has been effected by using production lines for some of their machines.



# GOOD NEWS!

Transfer Points Eliminate Guesswork in Die Making

as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wreach tip. Made in \(^9\) to 1\(^9\) diameters. 3/16\(^1\) 81.50 per set \(^1\) 61.25 per set \(^7\) 7/16\(^3\) 81.40 per set \(^1\) 1.20\(^9\) 3/8\(^8\) 1.35\(^9\) 8\(^1\) 1/2\(^9\) 1.50\(^9\) 8

HEIMANN MFG. CO.,

URBANA, OHIO

#### NEDCO

Electric

SANDING-RUBBING MACHINES

SOLVE YOUR SURFACING PROBLEM



THE NEDCO COMPANY WALTHAM MASS

#### DOES ACCURATE CHAMFER SHARPFNING

With the J-B Tap Grinder you can sharpen 2-3-4-or 5 flute taps, right or left hand. Grind uniformly and accurately on any taper or angle of chamfer. Taps are quickly and accurately set.

Taps sharpened on the J-B stav sharp longer.

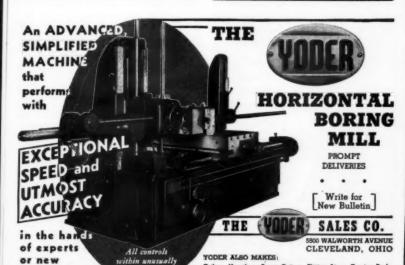
Send for additional information today!

#### EDWARD BLAKE CO.

NEWTON CENTRE, MASS.



Collers, Uncoilers, Scrap Cutters, Skitting Lines, Tension Reels, Bending Machines, Beading Machines, Brake Shoe Machines, Roll-Forming and Flying-Cut-off Machines.



trainces

easy reach

#### Series "4" Power Squaring Shears

A new line of Power Squaring Shears is announced by Ningara Machine & Tool Works. It is claimed that sheared edges can be cut reliably, straight to within a very few thousandths of an inch of a straight line, without any special skill of the operator. Narrow strips, accurate to gage setting and parallel within close limits, are easily produced without camber or curl. Strips may be cut at the rate of 75 per minute on 60 cycle current, it is reported.

The drive, including flywheel, gearing, clutch, eccentrics, and connections is wholly enclosed within machine and operates in a bath of oil. A new detent device is featured which completely replaces the customary friction brake and requires no adjustment or attention.

Standard equipment includes a direct connected 3 phase, 60 cycle, 110 or



220-440 volt a. c., ball bearing, splash proof motor completely wired with magnetic starter, start and stop push button control . . One pair of four cutting edge solid tool steel knives. . . Front gage with two front brackets, side and bevel geges, and a ball bearing, self measuring, parallel operating back gage adjustable at 1/128" increments.

# LITTELL Air-Blast



#### for Faster Safer Production

PAYS its cost in a few weeks time in —increased production —greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzje.

Automatic Roll Feeds dial feeds, magazine feeds, hopper feeds, for punch presess. Reals for coiled stock. Send for Circulars,

F. J. Littell Machine Co.

#### LINCO Two Spindle Adjustable Drill Head

Also Adaptable for Tapping

Drills two holes at once, made in several sizes, drill centers ½ to 6", speeds up to 3600 RPM, capacity drills 0" to 5%. Total weight of small head, with aluminum gear case, only 9½ lbs. Equipped with roller and ball thrust bearings. Especially engineered for Canedy Otto,

Demco No. 15 and similar drill presses—also suitable for use on larger drill presses.



Descriptive
Bulletin
Sent on request

LINDERME Machine & Tool Co. 12253 Coyle Ave. DETROIT, MICH.

#### Stepping-Up Aircraft Production

New facts on how leading aircraft plants are meeting their "tooling-up" crisis are revealed in an attractive new booklet "New Wings for Production", released by Delta Mfg. Co., 603 E. Vienna Ave., Milwaukee. Numerous photographs of actual air plant set-ups show some of the secrets of the growth in production capacity of such concerns as Bendix Aviation Corp., Consolidated Aircraft, Jacobs Aircraft Engine Co., and North American Aviation. In particular, this booklet emphasizes the clever adaptations of the new type lowcost precision machines:- drill presses, cut-off machines, metal-cutting band saws and circular saws-to meet the urgent needs of the rapidly expanding aircraft industry.

Of unusual interest is the series of photographs of special set-ups made at low cost with standard drill press parts for use in airplane engine production. It is noted that the equipment and setups illustrated and described in this booklet are also used in such plants as:-Glenn L. Martin, Curtiss-Wright, Pratt & Whitney, Boeing, Lockheed, Douglas, Beach, McDonald, Bell, Bell-anca, Fairchild, Ryan, Waco, Sikorsky, Stinson, and Fleetwings.

#### **New South Bend Lathe Catalog**

A new condensed catalog describing the entire line of South Bend Lathes has just been issued by the manufacturer.

Containing only 8 pages, this 81/2" x 11" catalog may be placed in a binder or filed in a standard letter file. The condensed data includes illustrations, basic dimensions, capacities, speeds and feeds of back-geared, screw cutting lathes having 9, 10, 13, 14½ and 16" swings, with bed lengths from 3 to 12 feet.

In addition, numerous attachments for tool room and production work are illustrated and described.

Copies of this catalog, No. 52, are available upon request from South Bend Lathe Works, Dept. M6, South Bend, Ind.



Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 151/4" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO. 112 Webster St., Dayton, Ohio



#### Heavy Duty Die Cushions

A new heavy duty, multiple mounting, Model 20 Pneumatic Die Cushion is now being manufactured by the Dayton Rogers Mfg. Co., 2830—13th Ave., South, Minneapolis, Minn.

These new cushions are selfcontained, carrying their own surge tanks, and are now made in sizes up to and including 24". They can be furnished in multiples of two, four or six, having maximum ring holding pressure up to and including 90-ton, with drawing capacity for deep drawing shells up to and including 10".

These cushions can be used for controlling the pressure pads; also, on all forming operations. Each cushion installation is supplied with a combination regulating reducing valve and pressure gauge to retain the correct draw ring holding pressure and pressure pad control throughout the work cycle, on a given job. The work-



ing pressure is recorded at all times, pounds per square inch, on the pressure gauge furnished with each installation.

This cushion is particularly suitable for large, straight side presses, for the drawing and formirg of such parts as table tops, stove tops, refrigerator sections, automobile body doors, etc.

#### Elastic Stop Self-Locking Nuts

A new broadside is offered by the Elastic Stop Nut Corp., 2325 Vauxhall Rd., Union, N. J. The principle on which Elastic Stop Self-Locking Nuts operate is described in detail with the aid of clear drawings. Some of the many applications of these self-locking nuts are also depicted.

## MAKE DUST GO WHO TORNADO

#### Portable Industrial Vacuum Cleaner

Cleans floors, walls, pipes, line shafting, boiler tops, everything in mill, shop or factory. Sucks up dust, dirt, grindings, chips, etc. Cuts waste and maintenance expense, reduces fire hazards, promotes health and morale.





1 H.P. GE motor gives ample power. 12 gal. dirt capacity. Weighs only 40 lbs. Attachments for cleaning everything. Power unit easily removable for blowing dust and dirt out of motors and machinery. Write for details and FREE TRIAL OFFER.

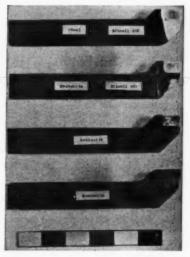
BREUER ELECTRIC MFG. CO. 5118 N. Ravenswood Ave., Chicago, III.





#### Meehanite Carbide Tool Shanks

It is reported that important time and cost savings are now being effected in many machine shops, resulting from a recent development in the application of high strength Mechanite metal for sintered carbide tool shanks. A more or less frequent problem, now particularly costly from the time standpoint, has been the breaking of tool



shanks on multiple tool heavy duty lathes. It is generally assumed that tool shank fractures are mainly caused by vibration, and it is asserted that due to the vibration damping qualities of Meehanite the vibratory stresses are absorbed, tool chatter reduced, and breakage drastically reduced. Furthermore, because the coefficient of expansion of sintered carbide more nearly approaches that of Meehanite than it does of steel, heat conductivity is improved with corresponding reduction of expansion stresses in service.

"A typical Carboloy tipped Meehanite iron tool shank was put in service by The Cooper-Bessemer Corp., Grove City. Pa., and performance reported



#### This Acousti-Booth Gives You a "Zone of Quiet" for Telephoning

Do you have trouble hearing phone orders because of factory noise around you? If so, put your shop phone in a Burgess Acousti-Booth. You'll be surprised how quiet it is inside. Patented, sound-absorbent walls soak up shop noise to give you a "zone of quiet." This booth has no doors because no doors are needed.

Easy to use-easy to install-easy to maintain. No mechanical parts to cause trouble. In daily use in hundreds of plants. Send coupon for full information.

520 W. Huron St., Chicago Please send Free booklet describing Burgess Doorless Acousti-Booth and how it makes tele-phoning easy in noisy places.

RGESS ACQUSTI-R 



They turn with the work" Write TODAY - and let us tell you more about them.

IODERN MACHINE CORP. 323 Berry St., Brooklyn, N. Y.



Semi - Automatic Heavy Duty LATHE

Just the Machine for Shell Work!

Suitable for rough or finished turning shells at maxmum feed. Put your shell operations on this fast powerful lathe

and turn out your work at top speed up to the limit of tool capacity.

Multiple tool holders can be supplied at front and rear; a turret mounted on separate saddle can be used instead of tailstock.

Full use of carbide tools can be taken by this heavy duty lathe. Ask for Circular No. 715.

Machinery Co., Inc. 410 Broome Street. New York, N. Y.

was as follows:-35 hours @ 217 surface feet per minute on high grade Meehanite castings and 8 hours @ 389 surface feet per minute on chilled castings. It was then ground and gave 16 hours @ 245 surface feet per minute and 24 hours @ 210 surface feet per minute on high grade Meehanite castings. Subsequently this tool ran 359 hours."

It is also asserted that these shanks may be ground more efficiently because silicon carbide wheels load up more rapidly with steel than with Mee-

Further details may be obtained from the Meehanite Research Institute, 311 Ross St., Pittsburgh, Pa.

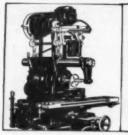
#### Capacitors for Outdoor Mounting

Capacitors with ratings from 2-1/2 to 180-kva, 230 to 4160 volts, for outdoor mounting on poles or cross arms are described in a new 12-page bulletin.

Application, distinctive features, and construction details are discussed, special attention being given to discharge devices, terminal bushings, and overcurrent protection. Complete information on mounting methods brackets is explained and illustrated with diagrams of typical installations. Outline drawings give physical dimensions of the more common capacitor A tabulation gives ratings, sizes. weights and styles.

A copy of descriptive data 49-165 may be obtained from department 7-N-20, Westinghouse Electric & Mfg.

Co., East Pittsburgh, Pa.



#### **Boost Out-Put From Old Tools**

For increased production convert shaft driven machine tools into direct motor driven units the low-cost Remco way. Remco makes the only drive which takes ANY motor of reasonable size-new or USED. No need to buy new motors, or new machines. Only drive on which motor may be switched instantly in case of "burn-out." Write for folder. Remco Products Corp., State St. at R. R., York, Pa.

#### REMCO MOTOR DR

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

Cuts Intricate and Straight



Cuts Circular and Irregular

#### SPEED-UP the job with BEVERLY Throatless SHEARS

SHEAR CO..

Just the thing to speed-up those vital Defense Orders! Cuts metal any shape with hair-line accuracy! No distortion! Precision workmanship and finest steel make BEVERLY last a lifetime! Investigate these efficient bench-type shears, today! Made in 3 Sizes

Na. 1 — cuts 14 gauge — wt. 16½ lbs. Na. 2 — cuts 10 gauge — wt. 33 lbs. Na. 3 — (Equipped with ball bearing holddown device) cuts 3/16 inch mild steel or 10 gauge stainless — wt. 55 lbs.

3005 W. 110th PLACE CHICAGO, ILLINOIS

#### SMALL WORK HELD SECURELY WITH THIS DRILL JIG

REVERLY

Salf contained and well built. Quick to change for length and diameter, for both shoulder work and gauging from the end. Chips fall away from gaug-

A.S.A. Standard bushings with liners of till any size hole up to % diameter. One bushing furnished with Jig. Volock to center work. Can be made my form for holding special pieces. Joking handle can be remared for ther hand.

Lat us send you may information



MACHINE TOOL BLUE BOOK

#### Miniature Panel Instruments

Miniature a-c and d-c voltmeters and ammeters in the 2" classification for general use are described in a new 12-page bulletin. Full scale readings on the d-c ammeter series are from 20 microamperes to 100 amperes and on the a-c units, from 5 milliamperes to 50 amperes. Voltmeter calibrations are from 5 millivolts to 1000 volts full scale on both a-c and d-c lines.

Permanent white dials, interchange-

ability of parts, and high overload capacity are among the features dis-cussed. Operation and construction are described with a note on repulsion vane types for a-c circuits.

Typical instruments are illustrated and cutaway views show construction A complete tabulation lists ratings, scale divisions, style numbers

and list prices.

A copy of catalog section 43-330 may be obtained from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



Headquarters for Standardized Die Sets. embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Sand for our new 336 Page Catalon.

#### E. A. BAUMBACH MFG. CO.

1810 So. Kilbourne Ave.,

CHICAGO, ILL.

#### Work Wanted

A NATIONALLY KNOWN MANUFACTURER OF PRECI-SION MACHINERY HAS FA-CILITIES FOR TAKING ON ADDITIONAL WORK for: W. & S. Turret Lathes, Boring Mills. Lathes, Punch Presses, Screw Machines, Precision Cylindrical and Internal Grinding, also Sub or Full Assembly Work.

#### **BOX 142**

c/o Hitchcock Publishing Co.

508 S. Dearborn St., Chicago, Ill.



#### No. 601-10"x16"x6"-18 ga. ....\$ .95 Stacking Boxes No. 602-12\*18\*18\*-16 ga. ......\$1.25

An excellent all-purpose shop box. Sturdy all-welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear.

No. 101-10"x18"x6"-18 ga. ....\$.75 Taper Pans No. 101-10"x18"x6"-18 ga. ....\$.90

One-piece, all-welded construction. Hook handle at each end. Prices F. O. B. Factory, Phila., Pa.

Immediate shipment from stock-Order Today American Metal Works, Inc. 1518 Germantown Ave.



#### Brown & Sharpe End Mill Sharpening Attachments

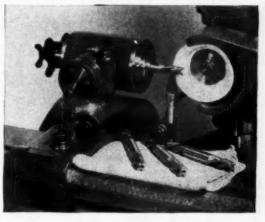
The Brown & Sharpe No. 10 and No. 13 End Mill Grinding Attachments have recently been substantially redesigned to permit sharpening the end teeth of end mills as well as peripheral teeth previously accommodated. Their names accordingly have been changed to No. 10 and No. 13 End Mill Sharpening Attachments.

The No. 13 attachment is of particular value in sharpening the peripheral teeth of steep spiral end mills having straight or taper shanks. For the latter work, a knob at the rear end of the attachment spindle makes

it an easy matter to hold the tooth being ground in contact with the tooth rest while feeding the cutter across the by longitudinal table movement; and mounting of the spindle on antifriction bearings is said to provide a sensitive, free-turning unit that is of especial advantage when sharpening very small end mills having a steep spiral.



The attachment spindle is carried in a body that can be set at an angle in both a horizontal and vertical plane, with rigid clamping provided for both adjustments. Graduations to 2° provide for angular settings to 16° either side of zero in the vertical plane, and



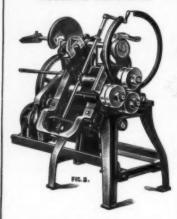
to 90° either side of zero in the horizontal plane, the base itself being aligned by the scraped inverted "V" of the table top. Zero marks 180° apart on the spindle body provide for sharpening both right-hand and left-hand cutters.

End mills having a No. 9 B & S taper shank will fit directly into the attachment spindle; while cutters having shanks of other B & S tapers, as well as cutters with Milling Machine Standard taper shanks and straight shanks, are accommodated by stock collets and adapters regularly available at extra cost. A draw-in bolt can be furnished at extra cost for use with spring collets for holding straight shank end mills.



BREMIL MFG. CO. 1720 Pittaburgh Ave. Erie.

# EXCELSIOR No. 14 ANGLE ROLLING MACHINE



Capacity 2x2x1/4\* Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the dversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

#### EXCELSIOR TOOL & MACHINE CO.

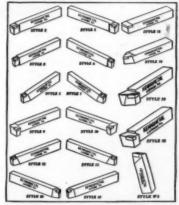
East St. Louis, Illinois

The large illustration shows the ease with which a double-end end mill may be ground with the aid of a spring collet and draw-in bolt. Other illustration depicts sharpening of end teeth in spiral cam lock end mill. Cutter is held in regular cam lock adapter.

Full details on this new attachment are contained in a recent catalog on the Brown & Sharpe No. 13 Universal Tool and Grinding Machine. It may be obtained from the manufacturer at Providence. R. I.

#### Kennametal Stock Sheet

A weekly stock sheet listing quantities of various standard style Kennametal carbide tools carried in stock has been made available by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa. Tools carried in stock are rough

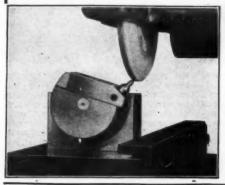


ground and tipped with Kennametal grade KM, the most commonly used grade for cutting steel. These tools are shipped immediately upon receipt of order, or partial shipments are made in the case of unusually large orders.

The Company also announces that the most popular types of standard Kennametal tools (when not carried in stock) are made up and shipped within 48 hours. On modified standard tools, orders are filled within one week to ten days.

### Speedy!

The WELCH Quick Angle Dresser speeds up the accurate dressing of grinding wheels to any required angle. It is quick and easy to use . . . accurate and precise in the results obtained.



#### Precise

The WELCH Quick Angle Dresser is available in plain or vernier types. Revolving dial on the plain type is graduated in degrees and the zero line is on the base block.

Vernier type has the same graduated revolving dial, with vernier cut into the base block. This is an unusual feature and precludes possibility of the vernier being moved.

After setting dresser to the required angle, tighten knurled hand knob and dresser is ready for use.

Write TODAY for full information and prices.

#### RODNEY WELCH INDUSTRIES

Makers of HIGH SPEED MILLING CUTTERS FORM TOOLS and SPECIAL TOOLS 19900 W. Eight Mile Road DETROIT, MICHIGAN

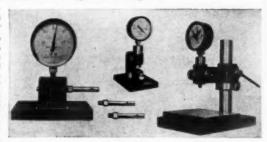


#### **Pneumatic Comparator Gages**

A pneumatic comparator gaging method has been developed by Moore Products Co., 3629 N. Lawrence St., Philadelphia, Pa., which accurately amplifies small dimensional differences and instantly shows them on a dial indicator. This method is said to be particularly suited to production gaging since the "wear" factor is eliminated, and

the operator does not require the sense of "feel" because of the clearance always provided. The measuring points, which are actually air nozzles, do not touch the piece being gaged, and accordingly cannot wear. Externally adjustable limit pointers are provided when speed of inspection is important.

In operation, a restricted amount of air from a filtered and regulated source of supply is admitted to the dial gage and measuring nozzle. With variations in size of work piece, clearance from



the nozzle is changed. This permits more or less air to escape from the nozzle which changes the pressure and indicates on the dial in decimal parts of an inch. The pressure regulating equipment supplied insures uninterrupted performance regardless of wide fluctuations in the main air supply line. The presence of heavy grease or loose dirt on the piece has no effect on the readings since the high pressure air instantly cleans the surface.

Internal bore gaging, especially for small holes and long tubes, which has heretofore been difficult and expensive, is asserted to be quite simple with the pneumatic gage. With this method the plug is merely a guide, and the measuring nozzles are recessed below the surface. The plug itself is provided with ample clearance over the minimum tolerance and accordingly fits quite loosely in the bore. The two nozzles are diametrically opposite to measure the true diameter and compensate for the side motion of the plug.

#### Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, etrike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
MIELSEN TOOL &
DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

#### FOR DEFENSE



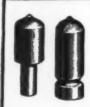
# DIAMOND POINTED EMERY WHEEL DRESSERS



Send for Prices Specify Holder

"If its made of Diamond-Ask us First."

E. KARELSEN, INC. 56 W. 45th St., New York, H. Y. Tal. VAN. 6-5688



# Air-O-cheko

#### LEAKPROOF AIR GUNS

Totally Different-Much Better Repeat Orders by Hundreds from Leading Plants Exclusive Patented Design Only Air-O-Cheks have enclosed lever that operates valve thru ball and socket joint. No packing gland. Streamlined.

No external levers or buttons.
Long service—low maintenance. Priced low Types and sizes for all requirements.
Catalog on request,



Fittings for Air and Welding Hose Standard and extra long shanks. Shipped from stock. Catalog on request.

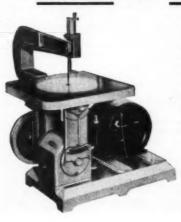
Made of Bar Brass and Stainless Steel, approval from stock. Just specify size of hose.

Fittings for Air a ard and extra lo stock. Catalog of

Get acquainted with the modern air gun. Try an Air-O-Chek and see the difference. Order sample on

AIR-WAY PUMP & EQUIPMENT CO., 401 S. Jefferson St., Chicago

# WHY WAIT? NEW ATLAS DIE-FILING MACHINES AVAILABLE FOR IMMEDIATE DELIVERY



Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type of chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast. The ATLAS Die-Filing Machine has every possible advantage for rapid and accurate diemaking—ATA BIG SAVING OF LABOR.

Price, complete with motor- \$125.00 Ne

F.O.B. CHICAGO

ATLAS EQUIPMENT COMPANY 103 S. Clinton St., Chicago, III. A 90° rotation measures "out-ofround," and a lengthwise motion measures taper and "bell-mouthed" conditions. Standard ring gages, representing the tolerance limits, are slipped on the plug at periodic intervals for an absolute comparison. This pneumatic comparator gage accordingly eliminates the clearance difficulties of "go" and "no go" methods.

The amount of magnification can be made to suit the tolerance measurements with .001" indicated by 2" or more pointer movement. Accurate dimensions are also read within less than 1/32" of the edge of the work piece.

With external gaging, a single nozzle makes the measurements from a hard-ened and ground surface plate. Range of adjustments for various size parts and depth of throat are made to suit the specific requirements.

In applications where it is desired to record the actual measurement, a circular chart recording meter is used instead of the indicating dial. This has particular value for long bore measurements, such as gun tubes, recoil cylinders, etc., where measurements are made for each inch of length and where the in-pection department wishes to keep a permanent record.

#### Littleford Offers Machine Bases, Gear Guards, Pans, etc.

A wide variety of machine tool parts and accersories is being fabricated from plate and sheet metals by Littleford Bros., 435 E. Pearl St.. Cincinnati, O. With 56 years fabrication experience behind them, they are using enlarged facilities to fill orders at a rapid rate.



The machine base illustrated is typical of the many bases which Littleford are turning out to customers' specifications. This service is helping to relieve machine manufacturers of some of their production problems.



Other products of Littleford Bros. include gear guards and lathe pans illustrated, special machine parts, splash pans, and splash guards. Full details may be obtained by addressing them.



#### Projection Inspection and Thread Grinding Films

Both Inspection by Optical Projecand Automatic Thread Grinding are comparatively recent but extremely important developments about which little or no textual matter exists. But, Optical Comparators and Automatic Thread Grinders are playing such an important role in the manufacture of defense products requiring great accuracy and quality of finish, that all students of modern inspection and thread production methods should become familiar with these machines.

To provide institutions giving technical courses with material for instruction in these modern methods of inspection and thread production, the Jones & Lamson Machine Co., Springfield, Vermont, has prepared two slide films illustrating their Optical Comparators and their Automatic Thread Grinders. Each film is accompanied by a written description in lecture form.

The films can be projected with any standard 35 m/m slide film projector and either or both will be sent gratis to any University, Technical School, or other institution providing technical courses; upon request of the principal in charge.

#### CONTOUR CUTTING

The Atlantic Saw Manufacturing Company has played a conspicuous part in the development of band saw blades for contour cutting. This company simplified the matter of ordering narrow sized blades, only one temper being necessary for cutting any and all metals, thus reducing number of band saw blades for the user to stock.





**Used Coast to Coast** 

#### PACKAGED IN SPECIAL BOX

Atlantic band saws for contour cutting are usually sold in coils of 100° lengths and are packed in special boxes adapted to the convenience of the operator. This box is constructed to prevent coil from unravelling, and permits easy withdrawal of the individual saw length required.

Atlantic band saws also used on all makes of band saw machines.

New Illustrated Booklet free on request.

ATLANTIC SAW MFG. CO., INC.
153 BREWERY ST., NEW HAVEN, CONN.





The Putnam Tool Company was organized in 1934, occupying the small shop shown above.

Today, only seven years since the first Putnam Tools were made, a new,

modern plant has just been completed . . . greatly increasing the production facilities . . . providing the finest in equipment and

From Obscurity to Leadership
IN SEVEN YEARS



working conditions. It is the type of shop which reflects in every way the quality of the tools that "Cut Faster and Last Longer".

PUTNAM TOOL COMPANY

2983 Charlevoix Avenue

Detroit, Michigan

#### Marking Stamps for Triple Shifts

To meet conditions arising from triple-shift operation in defense industries, N e w Method Steel Stamps, Inc., Detroit, is producing a new type of Inspectors' stamps facilitating identification of parts.

Instead of carrying a variety of designs to identify individual inspectors or operators, the new stamps are numbered from 1 to 99, the numbers in each group being enclosed in identifying shaped borders. Thus, one group has each number enclosed in a square, another in a triangle, another in a

oval.

The idea permits assigning identical numbers with different borders to in-

circle, another still-if needed-in an



spectors doing identical work. Inspectors can identify the operator making the part, also to distinguish night from day shift operators or inspectors. Use of the stamps should have a tendency to retard inferior workmanship.

The stamps are available in sizes ranging from 5/32 to 5/16" borders—the standard sizes including also 3/16 and 4".

Other designs of borders as well as special sizes are also available on special order. All identification hand stamps have knurled thumb and finger grips, and are specially heat-treated to prevent mushrooming. Borders and numbers carry the exclusive Newco bevel for long life.

#### HANDY WELDING GAUGE



For determining sizes of convex and concave fillet welds, permissible tolerances of reinforcements, etc. Write for details.

Chicago Tool & Engineering Co. 8365 So. Chicago Ave., Chicago, III.

#### TAMMS

#### BLUE LAYOUT DOPE

For tool and die-makers, Liquid form ready for immediate use? Quick-drying, non-rabbing. Scribe shows clear, distinct line without chipping or scraping off.

TAMMS BLUE CHALK
For checking leaks in castings. Write for Samples

TAMMS PYRAMID PYROMETERS
Portable surface types and instruments for heat
treating.

Get Catalog NOW.

Foundry Division TAMMS SILICA CO. 228 N. IASALLE STREET CHICAGO, ILLINOIS.



#### MAKE YOUR DRILLING JOBS EASIER

Increase Profits . . . Speed-up Production End Worker Fatigue . . . Increase Efficiency

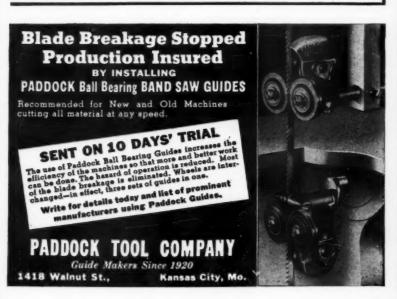
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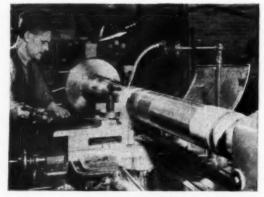
#### DRILLMASTER RADIAL DRILL

Economical in operating and first cost, this floor type, heavy duty, precicion-made, well-balanced Radial offers many features that merit your careful consideration. Drilling to the center of a 36° circle, No. 2 Morse Taper and heavy duty ½ HP ball bearing motor. The full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for bulletin giving full details.

Wm. C. Johnson & Sons Machinery Company St. Louis, Missouri





SPEEDING PRODUCTION
OF 105 MM. HOWITZERS. . . Machining
four howitzer barrels in
the time formerly required for one is an accomplishment of the Vilter Mig. Co., of Milwaukee. Usin g Carboloy
tantalum - titanium carbide cutting tools, Vilter has succeeded in
boosting cutting speed
from around 60 ft., per
minute to around 285.
A total of close to 600
lbs. of steel is removed
from each barrel (of
centrifugally cast steel)
during the turning and
boring operations. (Milwaukee Journal Photol.

#### New Cone-Drive Literature

Two new booklets on Cone-Drive gearings are now available. The first is designed for executives and others not primarily interested in detailed design problems. The second manual has been prepared for the ure of engineers and designers of machinery.



ROCKFORD, ILL.

Both booklets contain considerable information not previously published, including illustrations of numerous installations, details on how Cone-Drives are produced, specifications of speed reducers, and a discussion of gearing in general.

The booklet for executives is entitled "Why Cone-Drive" and carries the bulletin number CW 41B. The design and rating manual for engineers, which also includes complete specifications of standard blanks for worms and wheels, tables of all sizes of ratios for which tooling is available, charts and formulae for computing sizes, stresses, loads. etc., is designated as Catalog CW 41A.

Both are available from the Cone-Drive Division, Michigan Tool Co., 7171 E. McNichols Road, Detroit, Mich.



## The GLENNY Adjustable-Expansion BROACH

Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable paris. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed stock. Details ? Writs I

EAST SHORE MACHINE PRODUCTS CO. 833 E. 140th St., Cleveland, 0

#### **Dynamic Balancing Machine**

The NE-2 Globe Supersensitive Dyna mic Balancing Machine for determining amount and location of corrections required in overcoming unbalance in rotating parts ranging from 5 to 50 pounds in weight is shown.

weight is shown.
The "Micro-Indicator" dial on top front of each balancing head indicates a n d records amount of correction required in its respective correction plane. The an-

gular location is indicated and recorded by the "Neon-Lite" head. Approximately 30 seconds is required by the average operator, it is said, in determining condition of unbalance and required corrections on a typical rotating

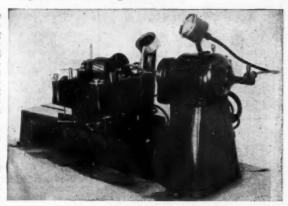
piece.

The exact amount of correction required for each end can be read directly, without cross transfer. This is made possible by the "Equipoise" feature which locks out the unbalance in one plane while reading that in the other. Then, without stopping machine, the locking point can be shifted to the first plane while reading un-

balance in the second.

The shaft or arbor carrying the rotating work is supported by two-point contact from self-aligning ball bearings which are themselves radially adjustable to accommodate a range of shaft sizes from % to 1-%" in diameter. Additional sizes may be accommodated by extra saddle adapters. The two-point support thus provided prevents lost motion otherwise encountered due to tolerance in shaft sizes. This lost motion, it is explained, would prevent accuracy of balance if allowed to exist.

The heads are adjustable along the keyways to accommodate various lengths between bearings with a range



of from 5 to 26". Corresponding adjustment is available along the "Equipoise" bar, providing a quick set-up feature without the necessity of cali-



5 YEARS When you purchase a

purchase a STEEGE Drive for your lathe, shaper, miller, etc., you're pro-



tectedbyourbroad 5-year guarantee. STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval.

Let us send catalog.

W. L. STEEGE MACHINERY CO.

(Our 25th Year)

548 W. Monroe St., Chicago, Ill.

### Champion Expanding Mandrels

%' to 6%' Efficient—

Dependable-

Write for catalog

THE WESTERN TOOL & MFG. CO.

Springfield a Ohio



#### ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

Send TODAY for latest circulars

PRINTZ ELECTRIC CO.
14595 KENTUCKY AVE.,
DETROIT. MICHIGAN

bration in locking out the proper correction plane in any new piece.

Adjustable resonance is made possible by the external snubber springs with which a wide range of balancing speeds may be obtained. Variable speed drive is provided from the special variable speed motor, driving through double - knuckle universal joint and chuck to the shaft. Speeds from 0 to 5000 r.p.m. are available in an infinite number of stable operating steps. Smooth acceleration to any predetermined speed is thus made possible.

A full line of these standard balancing machines is provided by Globe Tool & Engineering Co., Dayton, O., with which to accommodate weights from ¾ ounce to 25,000 pounds.

Wodack Electric Tool Catalog

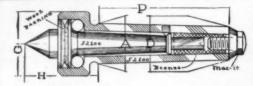
Catalog 45 describes the extensive line of Wodack portable electric tools. These handy tools are offered in a wide variety of sizes and types for production, maintenance, and many other types of work.

The catalog gives data on drills, a combination electric hammer and drill, sanders, grinders, and other tools.

Address Wodack Electric Tool Corp., 4627 W. Huron St., Chicago, Ill.

#### A Solenoid for Machine Tools

A solenoid designed primarily for machine tool use is announced by the John S. Barnes Corp., 301 S. Water St., Rockford, Ill. It is claimed that this solenoid is unharmed by oil or coolant. Feet and side plates are integral and made stronger. Plunger guides are made of phosphor bronze. Mechanical structures are said to be unusually rugged.



No. 52100 Steel, Gold Seal Balls. Mirror-Finish bearings, Mac-it Screws, Integral Ball-Races, Gracefully tapering Spindle, Bronze Bushing, Minimum Parts, Repeat Orders & 100%

Collections, are the characteristics that go with the Rigid Live Centers.

RIGID TOOL CO.,

2000 Witherell St., Detroit, Michigan

#### USE DETROIT POWER SCREWDRIVERS

# FOR PRODUCTION ECONOMY

THESE MODERN MAGAZINE-FEED POWER SCREWDRIVERS ARE USED BY HUNDREDS OF MANUFACTURERS.

NO JOB TOO TOUGH.

SEND SAMPLE ASSEMBLIES FOR PRODUCTION ESTIMATES.

DETROIT POWER SCREWDRIVER CO.



5363 ROHNS AVE., DETROIT, MICHIGAN

# SPRING TOOL HOLDERS FORMING For a wide range of work on lathes, shapers and screw machines. THREADING & FORMING For fine or coarse threading. Forming Forming Forming Forming Forming For coarse threading Forming

Especially adapted for use in aircraft, automobile and accessory plants.

No Chatte or Tearing. No Breaking of Cutters. No Demograd Work. Write for Details.

AUTO ORDNANCE CORPOBATION
1439 RAILROAD AVE.

#### **Electrode Pressure Gage**

An electrode pressure gage is designed to measure the pressure between the electrodes of resistancewelding machines. The gage is intended for use either as a standard for checking existing gages or pressure indicators on spot, line, or projection welders, or for checking the electrode pressure at the time of set-up, before proceeding with production work. It also may be used by testing laboratories for pressure determinations, or by industrials interested in checking the pressure of various kinds of springs in compression.

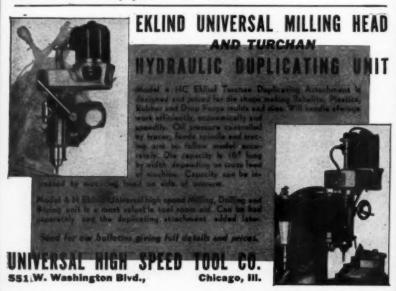
The new gage measures pressures from 0 to 4500 lb; an automatic stop safeguards it against damage, should pressure of more than 4500 lb. be applied. Consisting simply of a calibrated steel yoke and a micrometer dial indicator, the gage is easily applicable to existing resistance-welding machines without the need for jigs or other aux-

iliary equipment.

When electrode pressures are to be measured preliminary to production work, the gage is inserted between the electrodes so that they press on the pads on the top and bottom of the gage yoke. The electrode pressure is adjusted until the desired pressure is reg-istered on the gage dial. The gage is then withdrawn and the welding machine placed in operation.



The dial indicator is direct reading: no calibration curves or multipliers are necessary. It has two scales, one for reading in 10-lb. intervals up to 1000 lb., and the other to read in 100-lb, intervals.



#### "Builders" Deep Hole Boring Machine No. 3

Builders Iron Foundry, Providence, R. I., announces the Builders Deep Hole Boring Machine No. 3. It consists of a rigid bed upon which is mounted a geared headstock equipped with chuck for holding and rotating the barrel; suitable support for the opposite end of the barrel: suitable supports for the drill or boring bar; and means for holding and feeding the drill or boring bar into the work.

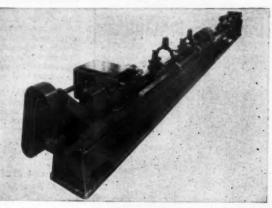
The headstock is equipped with three

changes of speed, and driven by a fourspeed a.c. motor, giving a total of 12 changes of speed. Minimum rpeed is 20 and maximum 375 r.p.m. The spindle is mounted on anti-friction bear-

ings.

The drill or boring bar is mounted in a carriage driven by a substantial lead screw. A separate feed motor drives this screw through pick-off gears, giving a total of 14 feed rates, with a minimum of 2" per minute and a maximum of 3.00" per minute. The result is a wide range of spindle speeds and feeds. Capacity of the standard model is:—156" length, 105 mm. diam., hole through spindle, 4½".

A separate motor is provided to move carriage in either direction at a rapid



rate-60" per minute. A high pressure oil pump circulates cutting oil.

An adjustable holding device for bor-



#### Price \$8.50 F.O.B. Chicago

HANDMAG Demagnetizer

AC Portable Type A low priced, highly efficient unit guaranteed to duplicate the performance of larger demagnetizers now on the

market. Will last a lifetime. We invite comparison.

Send check with order. We prepay the freight.

Territories Open for Dealers

Victor Machinery Company 130 So. Clinton St., Chicago, Ill.

#### ACCURATE, RIGID SURFACE PLATES

These particular surface plates are made of a high quality of close-grained, stress annealed semi-steel type grey iron. Of extra rigid construction, they have a three point suspension and are designed for a minimum flexion with a high degree of precision and are adapted for use where extreme accuracy

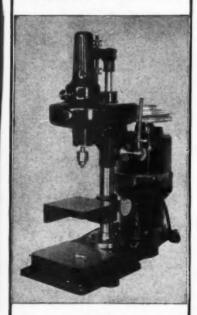




is required. They are manufactured in several sizes and deliveries are prompt. Write for full details.

LOMBARD GOVERNOR CORPORATION, Ashland, Mass.

# MODEL R-53 DRILLING MACHINES



# FOR PRECISION DRILLING CAPACITY #80 - 1/4 DRILLS

4 Spindle Speeds 750, 1500, 3000 & 6000 R.P.M.

Built in gangs 2 to 6 Spindles.

Can be furnished with Spindle Speeds 1500, 3000, 6000 & 11,000 R.P.M. Capacity to % Drills.

Send to-day for literature.

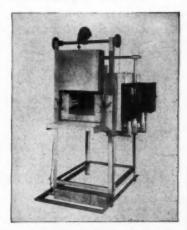
THE HIGH SPEED HAMMER CO., INC.

ing bar protects machine and tools against damage in case of overloads due to excessive feeds or hard spots. This device can be adjusted so that if the torque exceeds a set limit, the tool is released in the carriage and a limit switch is opened, stopping spindle and feed motors. All electrical circuits are interlocked to prevent damage in case of stoppage of any element.

It is stated that the machine is of modern design and heavy construction throughout, insuring sufficient rigidity to maintain accuracy under heavy cuts. The machine is fitted completely with safety devices and guards for covering moving parts which might cause injury.

#### Box and Muffle Type Furnaces

H. O. Swoboda, Inc., 197 13th St., New Brighton, Pa., announces production of a new line of "Falcon" Electric Box and Muffle type furnaces, adapted to a wide range of general and specific applications in factory or laboratory.



They are being used for testing of metal samples, melting of vitreous enamels, heating of high speed and similiar steels in tool rooms, for hardening and tempering, and many other varying applications. The furnaces are arranged for floor or bench mounting and are equipped with heavy alloy heating elements for efficient, long-life operation at temperatures up to 2300° F. Heating elements are supported in high grade refractories arranged in top, bottom, side and rear walls. Furnace chamber is completely surrounded by durable block type insulation.

The model illustrated (Type BRP without muffle) has a chamber 9" high, 12" wide and 36" deep, with a 16 kw. capacity suitable for 2.000° F. maximum operating temperature. Automatic temperature controls are mounted on side of furnace, completely wired for connecting to power supply. The furnace is equipped with a foot-operated door mechanism.

The furnaces are made in various standard sizes and can also be supplied in special sizes according to customer specification.

Ampcoloy Bronze Catalog

Ampco 'Metal, Inc., Milwaukee, Wis., offer a new catalog describing their Ampcoloy series of bronzes. This new book is well illustrated with photomicrographs, parts, and factory scenes. It contains de-criptions of the alloys and a comprehensive table of physical properties and range of chemical compositions.

Among the Amcoloy series are alloys of aluminum bronze, manganese bronze, beryllium-copper, high-conductivity, and high-lead alloys. Many government specifications for Federal, Air Corps, and Navy use are listed.



J. A. Richards Co., Kalamazoo, Mich.

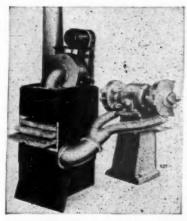


#### Hisey-Wolf Exhauster and Filter

A new Hisey-Wolf dust collector for grinding machines is both an exhauster and a filter. The dust laden air enters a cyclone collector removing the coarser particles. It then passes through impingement-type filters which arrest the fine dust, producing such clean air that it can be recirculated in the room, it is claimed.

A handy clean-out is provided for the heavy particles. The filters are readily removable for cleaning by shaking. The large fans and motors are said to provide high static pressure yet comparatively quiet operation. The motor is externally mounted for cool and clean operation.

This new exhauster and filter is offered in four models which have capacities ranging from 2 8" wheels to 2 24" wheels. Floor space required for all models is approximately 21x22.



Further details may be obtained from the Hisey-Wolf Machine Co., Cincinnati, Ohio.

#### \_BLUE PRINT CABINETS\_\_\_

### EASY ACCESS..... POSITIVE PROTECTION

for your Valuable Drawings and Tracings

#### THREE STYLES-

Available in Five-Drawer, Three-Drawer, and One-Drawer Units with dimensions 38\* x 26\*, 44\* x 32\* and 50\* x 38\*. These drawers may be sub-divided into smaller compartments. Furnished with either plain closed base or leg base.

#### CONSTRUCTION-

Sectional type. Drawers operate easily on roller channel suspension, gravity stops, lift compressors, and rear hoods. Solid bronze label holders and drawer pulls. Finish olive green.



#### THE INTERIOR STEEL EQUIPMENT CO.

2352 EAST 69th STREET, CLEVELAND, OHIO

SHELVING . LOCKERS . CABINETS . FILES . DESKS

# A Storage Unit That REDUCES HANDLING

"Stacked and Still Accessible"

#### of Parts and Materials

Because Stackbins are portable containers—not fixtures—parts and materials can be carried to departments, from machine to machine, or held in steekrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is inciantly accessible when its contents are needed—without disturbing any other bin.



STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly.



STACKRACKS are individual units which lock together to form storage racks of any size, shape or espacity, into which Stackbins slide like drawers.

STACKBINS in STACKRACKS offer a storage system that reduces handling, saves valuable space and speeds work. Write us for complete details and low prices.

#### STACKBIN CORPORATION 55 Troy St., Providence, R. I.



STURDY BUILT

for Long, Hard Service

BALDOR builds a complete line of Bonch and Pedestal type grinders - 6\* to 12\* wheels. (At left, is special Carbide Tool Giinder, 6\* wheels, complete for \$84.00).



EALDOR ELECTRIC COMPANY 4368 Duncan Ave., St. Louis, Mo.

BALDOR
BALL
BEARING GRINDERS



#### CONSERVE YOUR FIOOR SPACE



Sterling Racks utilize the space above the floor to the best possible advantage. They save time by making contents of all boxes immediately available - no unpiling to get to the right box. Furnished either with or without steel boxes. Made in units of one or five sections-all weld-

ed-rigid - non-tipping - non-swaying. Write for details-Tidy-up with Sterling Racks.

STERLING FACTORY EQUIPMENT CO., Inc. Providence, Rhode Island



Marking Defense Parts

A new complete outfit for stamping numbers into defense parts that have to be numbered is offered by Acromark. It is also handy for numbering name plates, tool checks, workmen's badges, metal or fibre identification tags, gears and innumerable other items.



The outfit consists of a precision constructed Arbor Press having a square ram to insure straight up and down movement. Ram is fitted with a press style Hercules Type Holder, taking any number of pieces of interchangeable type up to the capacity of the press which is 50 to 1.

The stamping block is cast iron machined and finished smooth and parallel with face of type. It has guide pins that can be placed in proper position for locating mark on the part to be stamped.

Several of these outfits are available for prompt delivery to defense industries. Specify Hercules No. 3 Arbor Press Outfit and indicate size, number of characters and material you want to stamp. Descriptive circulars are available from The Acromark Corp., 251-257 North Broad St., Elizabeth, N.J.

#### DoAll Grinder Bulletin

The new DoAll Surface Grinder is described in a bulletin announced by Continental Machines, Inc., 1300 S. Washington Ave., Minneapolis, Minn. It describes this machine in considerable detail and gives specifications.



This full capacity, industrial ½ Drill is handier, more powerful and an all-around better drill than many costing a third more. Specially wound high torque, forced-air cooled motor. Improved "natural grip" end and breastplate handle applies thrust directly behind drill point—and all quality features—oilless bearings, streamlined die cast case, etc., etc.

SPEEDWAY MFG. CO. 1822 S. 52nd Ave., Goero, III.



VISES
Plain or
Swivel—
5 types,



Wr. a for Catalog and Prices.
Dealers: Some Choice Territories still open
SHELDON MACHINE CO.
4242 N. Knox Ave., Chicago, Ill.

### THE REID HAND-FEED SURFACE GRINDER TO MEET THE REQUIREMENTS OF TODAY

#### INCLUDES:

- 1. CENTRALIZED CONTROLS.
- 2. TABLE DRIVEN BY CHAIN.
- 3. COMPLETE DUST PROTECTION.
- 4. ALL CASTINGS NORMALIZED.
- 5. EQUIPPED WITH OIL ROLLERS.
- 6. ADDITIONAL HEIGHT IF REQUIRED.
- 7. MOTORIZED SPINDLE IF DESIRED.

SPECIFICATIONS: CAPACITY, 18\*LONG, 6\* WIDE, 14\* HIGH WITH 7\* WHEEL. WORK TABLE 46\* LONG, 8\* WIDE.

**EXCLUSIVE SALES AGENTS** 

#### H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.

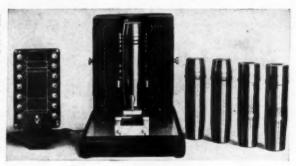
SEND TO DEPT. C FOR CIRCULAR

AGENTS THROUGHOUT THE WORLD



#### P. & W. Multiple Electric Contact Gages

A fast accurate. inspection method is embodied in the new Pratt & Whitney Multiple Electric Contact Gages. Engineered for each particular job, they indicate instantly in one opperation if any section of a part is too small, too large, or within the specified lim-



A green light flashes if the measurement is below safe tolerance, a red light if it is above. All lights out indicates that the part being checked is correctly within limits. When no part is the gage, all lights go on, giving a constant check of the signal lamps.

In the typical application illustrated, this principle is used in a Multiple Contact Gage for checking the outside diameters of shells. The gage convists of a small signal box, gaging fixture, and master shells (on extreme right). One master is for setting minimum and the other for setting maximum dimensions. Each gaging section has a fixed anvil and a movable spindle which actuates the contact arm. The light contacts are readily adjustable so that diameter tolerances may be set quickly and easily.

The manufacturer declares that these gages are compact and so rugged that they can stand up under the abuse of heavy production schedules. Gages of this design have been used for several years in the automotive engine industry and are rapidly finding new applications. One gage is a ten-station model for checking the angle and position of airplane propeller hubs. A piston gage is used by airplane and automobile manufacturers and another gage checks time fuse pinions for three dimensions.

#### **Engineering Data Sheets**

The interest of designing engineers and metallurgists in the monthly Engineering Data Sheets distributed by Ampco Metal, Inc., Milwaukee, Wis., has lead to publication of a selection of the most pertinent of these in a 56-page booklet. A wide range of subjects has been covered, and care has been taken to eliminate material duplicated in other Ampco literature.

Since the first data sheet was published in 1934 and others have been issued monthly, the new booklet contains the cream of an extensive collection of engineering material on Ampco Metal, an alloy of the aluminum bronze class and other aluminum bronzes.

Copies of new booklet will be sent on request to metallurgists and designing engineers interested in alloys of this nature.

#### THE PRECISION UNIVERSAL TOOL HEAD



brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROWKIYN, NEW YORK
Cable Address: "Pretool-New York" Tel: MAin 4-1064

The New Aber

Curved Tooth

#### WOODRUFF KEYWAY CUTTER



Many advantages over old-type keyway cutters:

More cutting edge
Cuts 50% faster

More cuts per
Sharpening

Full line standard sizes, round or square end shank, in stock. Special size cutters made to order. Territories available.

Circular with prices, on request.

#### ABER ENGINEERING WORKS

1613 Flett Ave.

Racine, Wisconsi

#### CUTS TOOLING TIME-SPEEDS PRODUCTION



THE UNIVERSAL VISE

Loads and unloads with amazing speedlever locks work instantly-holds securelyreleases quickly. No complicated adjustments—no costly drill fixtures needed just an inexpensive drill bushing plate and adaptor for each job. Sturdily constructed—nothing to get out of order. Quickly pays for itself. Only \$29.75 f.o.b. Chicago. Ten Days Free Inspection

Order MOHR LINO-SAW CO.
Today 130 N. Union Street, Chicago



# THE MARSCHKE LINE

#### GRINDING WHEEL EFFICIENCY

For real grinding efficiency pick the right grit, grain and bond and run the wheel at the proper speed! But even these essentials won't solve the grinding problem without true, smooth wheel rotation developed by rigidly supported spindles.

You will get the best offhand grinding results with dependable Marschke Grinders. Built to machine tool standards, Marschkes do the

work and spare the wheel. It makes no difference whether you need a I HP pedestal machine for tool grinding, or a 25 HP floor stand or swing frame snagger—there is a Marschke for your particular requirement. A Marschke will do your job more efficiently than any other machineof similar type—and save you money.

Send for Catalog showing over 70 specifications of Marschke Grinders and Buffers. Write to

VONNEGUT MOULDER CORP.
1805 MADISON AVE., INDIANAPOLIS, IND.





# INCREASE THE PRODUCTIVE TIME OF YOUR GRINDERS

With the Magna-Sine, you can reduce the time required for your angular grinding set-up—either single or compound—from hours to minutes. If you do an average volume of angular grinding or checking, the Magna-Sine can provide the means to greatly increase the volume of work turned out on any of your grinders.

As a time-saver, the value of the Magna-Sine for Delense work is unquestioned. Equally important is its extreme accuracy—to the exact limits of the standard gage blocks which are used. For angular grinding or as inspection equipment, it is meeting the requirements of hundreds of plants where precision parts are being produced.

The Magna-Sine, with the magnetic sine table, is available in three sizes in both compound and single angle models. A non-magnetic Sine Plate, used only for inspection work, is also furnished in three sixes and both styles.

WRITE FOR COMPLETE INFORMATION

#### The MAGNA-SINE

ROBBINS ENGINEERING CO. 639 Mt. Elliott Ave. . Detroit, Mich.

#### Multi-Breaker for General Use

For use on any normal-duty application that would otherwise require fuses or fused switches, a new low-cost multi-breaker is announced by Westinghouse.



Available in two types, M-1 and M-2, these 15 to 100 ampere, 2 or 3 pole breakers are for use on a-c circuits up to 230 volts. The sheet steel enclosure is dust-resisting (Nema type 1-A) with 10 concentric knock-outs for conduit or cable connections.

In operating, a bimetal thermal element is actuated by øverload or short circuit and causes the breaker to trip. However, while the breaker trips immediately on short circuit or dangerous overload, an inverse-time characteristic allows it to remain closed during temporary harmless overloads. An indicating target on the enclorure cover shows when multi-breaker has tripped.

#### **Metaline Bearing Catalog**

A complete new catalogue describing Metaline Oilless Bronze Bearings has been issued by the R. W. Rhoades Metaline Co., Long Island City, N. Y. It is arranged in three sections. One describes the lubricating properties of Metaline; the second part outlines the various types and the range of application for oilless bearings and lastly, the catalogue presents detailed data for use in preparing specifications.

#### Detroit Tap Announces Shell Thread Gages

To meet accelerated defense production needs, Detroit Tap & Tool Co., 8432 Butler, Detroit, has brought out a line of high precision thread gages for checking both internal and external threads on various sizes and types of shell.

Threads of these shell thread gages are preci-sion-ground and lapped with precision - ground thread-laps. A high wearresisting alloy is used, developed especially for the purpose. They are already in use in the plants of several large shell producers in the middle west.

Plug gages for checking internal threads are of the reversible type, virtually doubling useful life of the gages, while ring gages are adjustable and may be reconditioned and re-set when worn with the use of precision ground setting-gages. As shipped, the gages are adjusted and locked in position for immediate use.



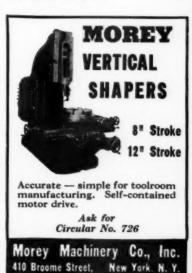
A new 16" swing turret lathe designed for rapid production on chucking operations and bar work is announced by the South Bend Lathe Works. It has a 1644" swing over the bed ways and saddle wings, 95%" swing over the tool post saddle cross slide, 1%" hole through the headstock spindle and 1" capacity through collet.

The ram type turret has both power feed and hand feed, with automatic indexing and individual stop for each of the six turret faces. A quick change gear box provides 48 changes of turret power feeds, also 48 changes of cross and longitudinal feeds for the tool post carriage and a series of 48 screw threads, ranging from 4 to 224 per inch. Provision is made for changing the direction and speed of the turret feeds with relation to the carriage feeds. Twelve spindle speeds from 10 to 731 r.p.m. are available. A two-speed motor



permits quick change from high to low speed for reaming and tapping operations.

Complete information is available from South Bend Lathe Works, Dept. M6, South Bend, Ind.



### MACHINE TOOL

# Blue Boo

Just how much do you know about the machine tool industry? Here's your chance to prove it by answering all 25 of these Quiz Questions correctly: 20 correct answers is Good and anything down to 15 correct answers is Fair. Figure your percentage on a basis of 4 points for each correct answer. You'll find all of these answers in Blue Book ads or on page 286.

1-Who advertises the "Tool of 1001 Uses?"

2-By whom is the Type "H" Hob Thread Miller made?

3-What firm offers propeller checking and balancing equipment?

4-What advertiser sponsors Lowell Thomas-News Voice of the Air? 5-"Copperspun" Rotors are featured

in what line of electric motors? 6-For what purpose is a "Cam Lock"

featured and by whom?

7-What Company recently featured drifting snow very effectively with obvious business implications?

8-Who makes "Namco" self opening dies, hollow milling heads and collapsing taps?

9-"The Bridle for Air Horsepower" is featured by what Company?

10-What's the purpose of the Sturtevant wrench?

11-Bryant Chucking Grinders are made in a city, the name of which is duplicated in other states. What is it and where?

12-Who makes the "Maximiller" and

13-The "Vernon" line is made by

whom and where?

14-Where is Charles F. Elmes Engineering Works located, and when founded?

15-"Internal threading of small diameters" is facilitated by what means? 16-What Company offers a new simplified munitions engraver?

17-"Utility Tools" are made by what

Company?

18-Who advertises "Deep Draws at Low Cost"?

19-Who offers equipment for "Doubling Riveting Production"?

20—"One Man Does the Work of 8" is headlined in connection with

what equipment? 21-Tail stock and tool post turrets are offered by what firm for converting engine lathes into turret lathes?

22-"Ground from the Solid after Hardening" is featured in connection with what cutting tools?

23-What products are made by Skilsaw, Inc., 5035 Elston Ave., Chicago? 24—Who offers the 40-H Index Mill?

25-"Shear Cut" is stressed in connection with what metal cutting machines?

# Let us send you this box of BORING TOOLS

Made up with an assortment of eight, ten, or twelve boring, facing, and threading tools in just the sizes you require—from 3/32" minimum boring diameter to 34". Standard and 4½" lengths. Workers have found this box a most convenient way of keeping the tools together—always handy when needed.

For all 'round work on cast iron, non-ferrous metals, and steels, we recommend our Grade G tipped with Tungsten Carbide.

For exclusive use on tough nickel and chrome steel, our Grade R tipped with Tantalum Carbide is ideal.

In ordering, specify the kind of metal to be cut and sizes desired, and we'll make up the set to meet your particular needs. Price is governed according to the tools desired. Ask for folder H-1139.

#### BOKUM TOOL CO.

49 W. Hancock Ave., Detroit, Mich.





You can save time, increase tool life and improve tooled surface finishes by preparing your soluble coolants and cutting compounds

PREPARED

COOLANTS

with a "LIGHTNIN" Mixer.
Whether you "make-up" for individual machines or have a central circulating or cooling system, a "LIGHTNIN" of the proper size and capacity is available to solve this problem for you. "LIGHTNIN" MIXERS CAN BE READILY CLAMPED ONTO ANY TANK OR VESSEL. They have been successfully used in large plants for mixing cutting oils for over twenty years!

Write for a catalog of "LIGHTNIN" Mixers. State the size of tank or tanks you use and the current available. Complete details will gladly be furnished.

MIXING EQUIPMENT CO., INC.

#### **Color Aids Machine Operators**

A new color system for painting machinery which reduces eye fatigue and promises to increase production was reported at the Atlanta meeting of the Illuminating Engineering Society on September 25.

Arthur A. Brainerd, of the Philadelphia Electric Co., and Matt Denning, of the Finishes Division of the Du Pont Co., gave collaborative findings of a two-year investigation into "Improved Vision in Machine Tool Operators by Color Contrast," which they said developed surprising results.

A color motion picture showed how brightness and contrast in paint colors on machinery combined to increase the accuracy of seeing, thus reducing accident hazards, providing more comfortable working condition, an dalso increasing production.

Many colors possessing higher light-reflecting factors than the conventional dark green or battleship gray of machine tools were tested under actual plant conditions, it was explained. Aluminum, light gray, light blue, yellow, and light buff coats were applied in turn to a punch press and a power shear over periods of two weeks. Photometric readings were recorded of light falling on and reflected from working surfaces while time studies were made of production rates. Separate records were kept of the research under both incandescent and mercury lighting.

The psychological effect upon the operators, consisting of 15 men, including two foremen, was determined by a simple questionnaire.

Ratings showed light buff and light gray with the highest scores, aluminum standing very high and light blue showing promise. In order to reduce mtaintenance problems, a compromise was made by painting all machines in "horizon gray" and "spotlighting" the working area with light buff. Surprisingly, the combination seemed to perform better than any of the solid colors,

BUY WHITNEY-JENSEN
WETAL-WORKING MACCURACY
TOT LONG LIFE AND ACCURACY

# ANGLE IRON COMBINATION SHEAR—NOTCHER—BENDER No. 455

Cut stock to length, notch it correctly, then b nd to the desired angle—all on one combination unit. Three took in one, mountained on a sturdy welded seel stand. Capacity 2°x2°x4°4 angles. An extremely useful unit for any shop that fabricates angle iron.

Write for Catalog 14



WHITNEY METAL TOOL COMPANY

### ABRASIVE CUTTER



Designed for tool rooms. Can be utilized for light production. Two convenient sixes for mounting on bench. Legs supplied at an extra cost. An inexpensive cutter costing only

#### \$140.00

Does quick and accurate cutting at minimum cost. No job too bard for Grit-Cut.

For quick repairs the cartridge type spindle can be removed and assembled spindle substituted.

The No. 6 machine capacity is 1° solid or 114° tabing. Size of wheel is 6°. Motor is 34 h.p., 3450 R.P. M. Spindle speed 10,000.

Let us send you complete details.

TUBE METHODS, INC.
Depot & Rambo Sts., Bridgeport, Penna.

Speeds DEFENSE Production



Accurate—Uniform—Flexible
—Convenient—Speedy Range
2750F. to 12500F.

DESPATCH UTILITY FURDACE

FOR TOOLS . DIES . PRECISION PARTS NON-FERROUS CASTINGS AND PARTS . HEATING ALUMINUM . FORGINGS AND RIVETS . METALLURGICAL LABORATORIES

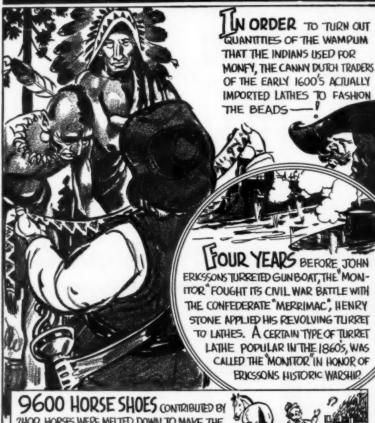
Despatch Utility Furnaces equipped for either Despatch Gas "Controlled Combustion" Heater or Despatch Electric Heater.

See Despatch Display at the National Metal Congress and Exposition Oct. 20th-24th, or write for Balletin No. 83-C.

DESPATCH OVER

MINNEAPHILS MINNESOT

# Mechanics Through the Ages



9600 HORSE SHOES CONTRIBUTED BY 2400 HORSES WERE MELTED DOWN TO MAKE THE 25-FOOT CONNECTING ROOS USED ON THE MAMMOTH CENTENNIAL ENGINE" BUILT BY CORLISS FOR THE PHILADELPHIA CENTENNIAL EXPOSITION OF 1876."



oa

d b'o

# THE SAME TURRET a New Hame



#### CWC TOOL POST TURRET

Sold by the thousands when under another name, this Tool Post Turret will be recognized by dealers and users alike.

This accurate, high quality tool now available from the original manufacturers, will speed up your lathe production, saving time and labor whenever repeat operations are required.

Model 31 For Small Lathes Model 41 For Medium Lathes Model 61 For The Big Ones

If your dealer can't supply you-order from-

#### CWC CORPORATION

HAWTHORNE . CALIFORNIA

Automatic Collet Closing Attachments, Cast Iron Surface Plates, Hexagon Bed Turrets, Speedy Polishing Lathes

# KIRK&BLUM DUST CONTROL SYSTEMS

#### Take "Dust" out of Industry

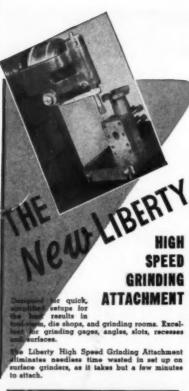
At Cincinnati-Bickford Tool Company's enlarged finishing department KIRK & BLUM Engineers have again demonstrated their ability to provide modern industry with better, more economical dust control. Ten stations are served by KIRK & BLUM Systems, which exhaust 51,000 cu. ft. of air per minute.

"Over a Third Century of Service to American Industry"

Write for Catalog.

The Kirk & Blum Mfg. Company







LIBERTY TOOL & GAGE
225 GEORGIA AVE. WORKS PROVIDENCE, D. I.

#### Clark Hardness Tester

The Clark Hardness Tester is a sturdy modern unit for direct hardness readings on raw stock or fabricated meta: parts, in the various standard scales, viz:—the C, A, D, B, E, F, and G scales. The tester uses a diamond point, a "" ball and a "" ball, with a major load of 150 KG., consisting of three calibrated weights (60, 40 and 50 KG.) and a minor load of 10 KG.



The dial has two sets of numerals. The black numerals give direct readings when the diamond penetrator is used, while the red numerals give direct readings when the "" and "" ball are used. It should also be pointed out that conversion readings can be made.

Operating lever is worked without fatigue. It has been arranged to free the main beam immediately, thus allowing main beam to drop with its actual load without any friction to overcome from this source.

There are but three simple adjustments which enable operator to make compencation for minor difficulties, viz:—(1) Adjustment for increasing or decreasing minor load; (2) The gap adjusting screw and (3) The Indicator Holder. The main beam is dashpot con-

#### THE MIDGET



LATEST ADDITION TO OUR LINE OF INDICATORS AND GAGES

SIZE

Designed for those "Hard To Get At" Places.

Waltham Dial Gage Co. MASSACHUSETTS STOW,

#### For Defense Production...



PANTO COMBINED ENGRAVER ELECTRIC MARKER, and ACID **ETCHER** 

Compact pantographic bench-type machine, with in-terchangeable heads, for wide range of work. Illustration shows engraving head attached.

CUTTER GRINDER
Accurate inexpensive unit for sharpening single-lip
engraving and routing cutters.

MASTER COPY TYPE 2 and 3-dimensional brass and 3-dimensional plastic, for engraving, marking, die cutting.

#### CUTTERS AND ENDLESS BELTS FOR ALL TYPES OF ENGRAVING MACHINES

· Write for literature

H. P. PREIS ENGRAVING MACHINE CO. 157A SUMMIT ST. **NEWARK, NEW JERSEY** 

### Announcing!

#### NEW IMPROVED DESIGN KALAMAZOO

# METAL - CUTTING

Here's the most accurate cutting band saw available. 95 per cent of national defense industries require at least one of these precision saws.

#### IT MUST BE GOOD

Used by Army, Navy, Aircraft and Shipyards. Write for complete information.

MACHINE TOOL DIVISION KALAMAZOO TANK & SILO COMPANY

8"x16"

CAPACITIES

508 HARRISON STREE KALAMAZOO, MICHIGAN trolled, with an adjustment for increas-

ing or decreasing the speed.

Two models are offered with 12" and 8" vertical capacity, known respectively as models US-12 and US-8. Throat capacity on each is 7". Overall height is 24" and 29" respectively, and shipping weight 230 and 215-lbs.

Operating screw is 1-11/16" in diameter and it has a 4 - pitch Acme thread. A telescoping cover in the throat excludes dust and dirt, and an oil reservoir is provided in base.

It is made by Dearborn Tool & Die Co., 10200 Ford Road, Dearborn, Mich.

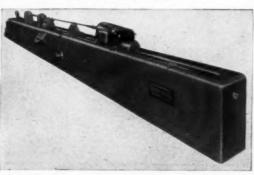
#### "Barnesdril" No. 1 Horizontal Honing Machine

An hydraulic machine for honing small, long holes is announced by the Barnes Drill Co., Rockford, Ill. It will hone bores up to 1½" diameter. Standard working stroke is 8; but it can also be built with stroke lengths from 6 to 12.

The "Barnesdril" No. 1 is especially adapted to producing a true, smooth finish on the internal cylindrical walls of rifle bores, tubes, cylinders, and other long work. Either hydraulic or me-

chanical hones may be used. Like all "Barnesdril" horizontal honers, this modern machine tool has a unitary manual controlling lever. There is also an auxiliary lever for "short-stroking." All controls, including push button station, are grouped together for operator convenience.

Reciprocating control is accomplished by means of an electrically operated hydraulic system. The change in the direction of travel at each end of stroke



is claimed to be made quickly and without shock with controlled overrun so that the surfaces at these points will be uniform with the remainder of the bore. A special control is available for blind end honing which causes the spindle to hesitate slightly at the blind end for removal of all the stock, but no more.

Spindle is rotated by means of built-in electric motors in the carriage.



#### CUTS SHEETS 3 to 5 at a time LIBERT Hi-Speed SHEARS

In recent production "speed-upa" Libert Hi-Speed Shears—10-gauge capacity—are daily cutting 3, 4, and 5 sheets of Steel AT A TIME 1 All quick, clean cuts, requiring no further finishing. This is typical of the job Libert Hi-Speed Shears are doing for everyone using Sheet Metal. Let us tell you about Libert's unusual speed, accuracy, flexibility, efficiency, economy. It's a story that helps you to savings, practice.

LIBERT MACHINE COMPANY, Green Bay, Wicensi the of sight libert Manufacturers of Shears since 1915

Oue of eight Libert Shears at North American Aviation Plant, Inglewood, California.

Libert HIS SHEAR

Use the Scherr Comparitol Inspectoset For Defense Inspection

Here is an inspection unit that belongs in every shop producing work to close limits. The COMPARITOL is graduated to read to .0001", plus and minus .002". The ULTRA-CHEX Inspectoset consists of 34 gage blocks which will produce thousands of combinations in steps of 1/10000" from .300" to 8".

By setting the COMPARITOL with an INSPECTOSET combination you can check all shop gages, mass pro-

duced parts, pins, ball bearings and other articles. ANY SHOP, LARGE OR SMALL, CAN AFFORD THIS COMBINATION UNIT. Write for literature, quotation and delivery dates.

#### **DOING CONTRACT WORK?**

Eliminate chance of rejection by inspecting your work with the COMPARITOL-INSPECTOSET Unit.

GEO. SCHERR CO., INC.
122 Lafavette St., New York



# FAST PRODUCTION NEEDS CORRECTLY GROUND TOOLS

Manufacturers are saving many valuable manminutes with the Sellers automatic method of duplicate tool grinding which produces and reproduces practically any straight or curvex form to exact specifications by following a template cam.

If you want to save time in tool grinding—and lower tool costs too—investigate Sellers Tool Grinders today.

William Sellers & Co., Incorporated
1616 Hamilton St., Philadelphia, Pa-



WRITE



Change gears provide a choice of spindle speeds. Gearing is fully-enclosed

and self-oiling.

The means for supporting the spindle carriage upon ways is said to eliminate any possibility of vertical movement of the carriage, while at the same time offering a minimum amount of frictional resistance to its horizontal movement.

The rigid, fabricated bed is designed to occupy a minimum of floor space. Barnesdril Bulletin 147 gives detailed

description of this machine.

#### Ryerson Installs New Annealing Furnace

A modern, 24 ft., annealing furnace has recently been installed by Joseph T. Ryerson & Son, Inc., for annealing stock steel products after they have been flame cut. Usually it is not necessary to anneal after flame cutting. However, with some types of steel, occasionally in the case of plates, and in some situations this is desirable.





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Here at one source are all belt lacing needs, dependable satisfactory products of guaranteed material and workmanship. Write for Catalog. Though 24 ft. long, the furnace can be divided into three sections as shown. Each of the three furnaces may be used as a separate unit, permitting an exceptionally prompt annealing service. The furnace, especially designed by Ryerson engineers, has a structural steel framework and is lined with a special heat resisting material. It is crane-served and so situated that steel to be annealed can be quickly transported to the furnace from any part of the huge Ryerson plant. The furnace is gas fired.



The "finger-tip" control equipment shown plays an important part in this new service due to the importance of temperature control and timing in the annealing process.

Steel is annealed for one or more of

the following reasons:

 To soften it for improved machinability, or to permit certain types of cold working, forming, etc.

(2) To refine the molecular structure of the steel which may have been affected by previous thermal operations such as rolling, flame cutting, etc.

(3) To relieve internal stresses which may have been developed by rolling, cold straightening, forming, cold draw-

ing, etc.

The annealing process most frequently used consists of cooling the steel very slowly, from a temperature slightly above its upper critical point. Control of the temperature, length of time in which the steel is held at various temperature and rate of cooling are all extremely important in assuring the desired results.

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Micro Bender No. 1 Is Improved

The latest improvements on the Micro Die Duplicating Bender No. 1, made by O'Neil-Îrvin Mfg. Co., 314 8th Ave., So., Minneapolis, Minn., are said to increase its ease of operation, stability, and



hourly output.

It now has two-way operation, left and right, which overcomes interference of material ends with work al-

ready formed.

The forming nose is reversible and can be changed in 30 seconds, it is claimed. Working capacity has been doubled, permitting material twice as wide. A positive adjustable stop (arc welded) holds forming nose rigidly in position when shaping heavy material. There are also additional provisions for material guides.

The new Micro Bender No. 1 is 3 lbs. heavier and has  $2\frac{1}{2}$  times greater bearing capacity, promoting long life

and permanent accuracy.

Bulletin on Electroplating Equipment

Motor Generator Corp., Troy, Ohio, has just published a 4-page bulletin describing their latest models of motor generator sets, electroplating sets, and anodizing sets. Copies of the publication may be obtained free of charge by writing the company.

#### TWO VALUABLE WELDING BOOKS

**Arc Welding Handbook** 

The new 6th edition "Procedure Handbook of Arc Welding Design and Practice" contains

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#### Black & Decker Announce a Heavy Duty Sander

A 9" heavy duty sander is announced by Black & Decker Mfg. Co., Towson, Md. This new tool is designed for constant production-line use with 9" abrasive discs. It is said to be especially adapted for use with wire cup brushes, saucer grinding wheels for right-angle grinding, and planer heads for wood shaping and surfacing.

This sander's many features include:

—a new spindle-lock for quick disc changing, spiral-bevel gears made by B. & D., switch and commutator sealed against abrasive dust and grit, pusher-type steel fan, adjustable side handle for right or left hand use, and a sturdy, full-powered universal motor.

Stainless-Clad Spun Heads
Illustrated is a group of 108" diameter

include:

ASME Code flanged and dished heads
made from Jessop "Silver-Ply" stainless-clad steel for use in National Defense. These heads were fabricated by

ASME Code flanged and dished heads made from Jessop "Silver-Ply" stain-less-clad steel for use in National Defense. These heads were fabricated by hot spinning in the plant of the Lukens Steel Co., at Coatesville, Pa. By substituting stainless - clad steel for solid stainless, savings were made of 35% in material costs and 80% in the amount of chrome and nickel required. The savings in chrome and nickel are particularly significant in view of the fact that these strategic materials are now on the Priority List.





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#### **Granell Automatic Feed Surface Grinder**

An automatic feed grinder adapted for surface, cylindrical and plug grinding has been developed by G. P. Granell & Son, 292 Geary Ave., Toronto, Cannda.

ing surface is 24" long by 10" wide. Table is driven by a worm-rack and travels in one flat and one "V" way, provided with oil rolls for lubrication.

Longitudinal table feed is automatic. Reversal of table is controlled by adjustable dogs operating against a reversing lever. Manual reversal is accomplished by a convenient control level on front of machine.

Transverse table feed is automatic with a range of .006 to .110" at each reverse of table.

Automatic knock-off lever provides instant stopping and starting of longitudinal and transverse table movements. Feed is positive and mechani-

cal. Four variable table speeds are available. Change from one speed to another is by a simple button control.

Straight wheels up to 1" thick and 10" diameter with 11/4" hole can be used.

Special attachments for cylindrical or plug grinding can be installed, making this a 3-purpose machine. Standard equipment includes one 10" x 34" grinding wheel with 11/4" hole, set of wrenches and a can of spindle oil.

Floor space required is 90" x 34". Approximate net weight without motor or countershaft is 4600 lbs.; domestic crating, 4850 lbs.; foreign boxing, 5000 lbs.

Capacity is given as 34" long, 10" wide and 14" high using a 10" diameter wheel. Additional emergency height up to 24" may be obtained by removing top of sliding block.

Spindle is of chrome molybdenum steel, conforming to SAE-4150 analysis, heat treated, ground and lapped. Spindle runs counter-clockwise in a phosphor bronze front box with adjustment for wear and end play. Spindle speed is 3500 r.p.m. Provision is made for suction of abrasive dust.

The 12" diameter handwheel is graduated to half-thousandths.

Work table is 68" long and 12" wide. Hand travel is 36", automatic travel 34". Cross feed, automatic, is 10". Work-

#### Cincinnati Offers New Condensed Catalog

The latest publication issued by Cincinnati Milling Machine and Cincinnati Grinders Inc., Cincinnati, Ohio, is devoted to machines for milling, broaching, die sinking, grinding and lapping. This handsome 28-page booklet M-995 contains illustrations, brief descriptions and specifications of all current design machines . . . the type of condensed buying information which is so essential today. Copies will be sent on request.

#### South Bend 48" x 96" Surface Plate

Cast in semi - steel and finished plane within .005", this large surface plate offers seven specific support - points for utmost flexibility in usefulness. Two sizes of adjustable blocks or legs (10" and 12") provide possible workingsurface heights between 29" and 33". The blocks support threaded 11/2" screws, e a c h topped with a circular which is recessed to contain any of the projecting support - points on bottom of plate. A

12-pitch thread provides fine adjustment to compensate for floor irregularities, etc. Five of these blocks are provided with each surface plate.

The ribbed under side of plate is designed to provide maximum strength without excessive weight. The surface plate weighs 3 tons. Under side of plate is painted red and the blocks are green.

Originally made by South Bend Tool & Die Co., 2507 So. Main St., South Bend, Ind., for use in their own factories, the surface plate is now offered as a standardized product for machine shops, tool and die makers, and large toel rooms.

Soldering Flux for Stainless

No. 400 soldering fluid is announced by Fred A. Towner Chemical Co., Muskegon Heights, Mich., which is designed for use with stainless steel or chrom-

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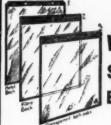


ium. It is reported that it will solder all kinds of metal, even black iron, without cleaning, yet is not injurious to the hands. It is also said to be free from strong fumes.

This is in addition to the Towner line which includes two other soldering

fluids and a soldering paste.

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5—Fairbanks - Morse & Co., 600 S. Michigan Ave., Chicago.

6-End Mill Drives by Brown & Sharpe Mfg. Co., Providence, R. I.

7—The R. K. LeBlond Machine Tool Co., Cincinnati, O.

8—National Acme, 170 E. 131st St., Cleveland, O.

9-Ross Operating Valve Co., 6480 Epworth Blvd., Detroit.

10-Accurate and uniform tightening of nuts and bolts.

11-Springfield, Vermont,

12—The Kempsmith Machine Co., Milwaukee, Wis.

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15—Modern Collapsible Taps, made by Modern Tool Works, Rochester, N. Y.

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18—Dayton Rogers Mfg. Co., 2830 13th Ave., So., Minneapolis Minn.

19-Chicago Rivet & Machine Co., 9610 W. Jackson Blvd., Bellwood, Ill.

20—Anderson Power Scraper made by Anderson Bros. Mfg. Co., Rockford, Ill.

21-Jefferson Machine Tool Co., 700 W. Fourth St., Cincinnati, O.

22—Midget Milling Cutters made by Severance Tool Co., 1522 E. Genessee Ave., Saginaw, Mich.

23—Portable Electric Saws, Belt Sanders Drills and Disc Sanders.

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Bar Cutters	Chucks, gir	Drills, multi. spdl.	Grinders, snagging
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Boring Tools	Die casting mchs.  Die Cushions	Gages, pressure	□Lapping Com-
Brakes, hand pwr.	Die Duplicating	Gear Bores	pounds
FiBroaching Macha	machines	Gear Cutting Mch.	Lapping Machines
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□Lathes, bench □Lathes, engine □Lathes, extension bed and gap □Lathes, polishing &	Presses, forming Presses, hydraulic Presses, power Presses, punch Presses, percus.	Shears, power Shears, rotary Shears, squaring Shears, throatless Sheave wheels	Transmission, var. speed Trucks Trumbling Barrels Turrets, Tail-stock
buffing   Lathes, shell   Lathes, speed   Lathes, spinning   Lathes, toolroom	Presses, toggle Profiling Machines Pullers, heavy duty Pulleys Pumps, centrifugal	Sheet Metal Machinery Shelving steel Shims and Shim Stock	□Turrets, tool post □Universal Joints
Layout fluid Lighting Equipment Lubricating systs.	Pumps, coolant, lubricant & oil Pumps, hydraulic Punch Press Feeds Punch Press Guards	Shop lights Sleeves Slotting machines Speed Reducers Spring coiling and	□Valves, cir □Valves, foot, sole- noid, pilot □Valves, hydraulic □Vises, bench
□Machine Tool Drives □Magnetic chuck controls □Mandrels	Punches, hand, power Punches, multiple Punches & shears Punching Tools	forming machy.  Sprockets Stampings Steel Steel, black finish Steel Stamps	□Vises, machine □Vises, machinists' bench □Vises, pipe □Vises, planer & sh
Marking machines   Meters   Micrometers   Milling attach.   Milling Machines	Pyrometers  Racks, bar stock Reamer Holders Reamers	□Storage Racks and Bins □Straightening Mchy. □Stud Setters	□Vises, universal □Washers □Welders, arc □Welders, engine
Milling Mch., bch.   Milling Mch., hand   Milling Machines, turret   Mills, adjustable	Reamers, cir drill Reels, stock Riddles, Foundry Rivets Riveting Machines Routing Machines	Superfinishing Surface Plates  Tables, elevating Tables, rotary	driven   Welders, seam   Welders, spot   Welders, tube   Welding   Accessories
hollow   Molybdenum   Motors   Motor drives   Nibbling Machines	Sanders Saw Sharpeners Saws, band Saws, hack	Tap Extractors Tap Holders Tapping Machinery Tapping Machines, portable	Welding controls   Welding rods   Wire Forming   Machines   Wire Straightening
Numbering Machs.    Numbering Machs.   Oil and grease seals   Oil cups   Oil groovers	Saws, hole Saws, metal cut. Scrapers Screw Mch., auto. Screw Mch., hand	Taps Testing Machines Thread Grind. Mch. Thread Roll. Mch. Threading Mchs.	Machines  Wire-Working  Machinery  Wrenches
Oils  Parallels Pillow Blocks Pipe, cutting and	Screw Machine Tools Screws, cap, set, saf. set & mach. Screws, Mch. & pl.	Toggle Clamps Toggle Pliers Tool Bits Tool Holders Tool Salvage	
threading mchs.    Planers     Plating, chrome     Press Brakes     Presses, arbor     Presses, bench	Screws, recessed head Screws, transfer Shafts, flexible Shapers	Tools, carbide Tools, cutting Tools, cutting-off Tools, filing Tools, lathe & plan.	*******************************
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#### Welding and Cutting Bench

The combination welding and cutting bench illustrated (courtesy Hobart Brothers Co., Troy, Ohio) is a useful piece of equipment for industrial maintenance departments or job welding shops. It can be built in size and shape to suit individual needs.

The top frame is of ½" x 2½" x 2½" steel angles with the horizontal leg turned in to support the cross members, which are ½" x 2½" steel plate, cut to length so that they slide down into ½" slots on the inside of the vertical leg of the angle iron top frame. These cross members are thus removable and may be spaced close together or far apart to support

parts that are to be cut by means of the cutting torch or arc. Floor under the bench is covered with refractory brick as protection from sparks and molten metal, while the steel plates around the brick offer extra protection in addition to keeping the

bricks in place.

For welding, a removable steel plate of the desired size may be used, as shown, to form the bench top. Note the convenient vire mounted on one corner of bench, and the electrode receptacles, made of scrap pipe welded to bases of steel plate.



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Schutte, b.c. Schutte, b.c.
Grinders Brown & Sharpe No. 1, 2, universal,
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Grinders, No. 55, 69, 65, Heald internal,
Hammers, Pettingell trip, No. 1, 2,
Lathe, 14°x6′ Louge & Shipley, grd, hd., 12 speed,
Lathe, 21x8′ LeBlond, 3 step cone, heavy,
Lathe, Hendey, yoke, 44°, 26°,
Lathe, Buddey, yoke, 44°, 26°,
Lathe, 24x10′ Wickes Bros. q.c., 3 step cone, heavy,
Lathe, 24x10′ Crawford, 3 step cone, heavy,
Lathe, 24x10′ Crawford, 3 step cone, heavy.

Latile, Hendey, Yone, 18", 20".
Latile, 28'10' Wickes Broa., q.c., 3 step cone, heavy.
Latile, 28'10' Wickes Broa., q.c., 3 step cone, heavy.
Latile, 28'10' Reed-Prentice, grd. head, m.d.
Latile, 20' Reed-Prentice, grd. head, m.d.
Latile, 20' Reed-Prentice, grd. head, m.d.
Latile, 20' Reed-Prentice, grd. head, 20' Reed-Prentice, geared head.
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Miller, Ischemati No. 3 Universal.
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Globe Machinery Co. 602 W. Lake St., - -· Chicago, Ill.

Pratt & Whitney & 4 Bausch, 2 spindle horiz, 1½" cap, size 13x9'8" bed, swing 7".

Boring bar, 3", Beaman & Smith horiz, floor type, gear box, motor drive.

Broach, LaPointe-Hudson, No. 3, m, d, cut keyways to 1½", bro. sq. holes to 3½" across flats, 54" stroke, Lathe, Johnson, 21"214', gd. hd., 2 steady rests, face

plate, arr. m.d. 3# xrv, gd. ma., a seasy reass, sace plate, arr. m.d. 3# x60" low swind, gd hd., 2 carr. Lathe, Fichburg 3# x60" low swind, m.d., complete. Lathe, Harrington 48" gap, 18" between centers when bed is open.

Ded 18 Open.

Pipe threading machine, cap. 2" to 8" arr. m. d., including 8 diez, cutting-off attach. & oil pump.

Planer, 36" 25" 18" Hamilton, 1 head on cross rall.

Planer, 36" 36" 116", 6" bed, Gray, 2 hds. on rail.

Wire straightener & cutt, mach., cap. \$3' 16-3' cut-off.

Foster Machinery Co. 3982 Bluestone Rd. Cleveland, O.

Bulldozer, Williams & White No. 4, double end. Forging roll, No. O.C. Ajax. Lathe, 13x6, South Bend. Punch, Long & Alisatter, 38" throat, 12" cap.arch jaw, Saw, 6" Newton, cold. Saw sharpener, 11S Cochrane & Bly. Welder, 2" butt.

MACHINE TOOL BLUE BOOK

#### FOR SALE BY

#### Standard Machinery Co., 347 Indiana Ave. Grand Rapids, Mich

Automatic, §" Cleveland, single spindle. Drill, 46" New Haven No. 3, sliding head. Extractor, DeLaval, size No. 26. Gear cutters, Whiton No. 18 automatic, (2). Grinder, cylinder, Heald No. 83. Grinder, drill, Sellers 3" capacity. Lathes, mig. 12" 26" Fratt & Whitney, (2). Lathe, 34" 3" Lodge & Shipley, q.c. 25. Saw, Peeries 5" 26" high speed. Tapper, Anderson No. 40 Dial Feed Auto. Welder, Expert Portable spot, 56 KVA.

#### Jones Machine Tool Company Cincinnati, Ohio Front & Pike Sts.,

LATHES 16"x8' Lodge Ship., q.c. 18"x8' Mueller, q. c. 18"x10' Monarch, q. c. 20x8 Whitcomb g. h., q.c. 28"x14' Boye & E., c. d. 32"x16' Pittsburgh, c. d. 32"x14' Amer., c. d. No. 6 W. & S. turret, 24"x44"x14' S. & B., dbl. 36"x16' Put, 1rl., 1s. h. 32"x12' N. Haven, 1 hd. s. h. | 24" Cin'ti sgl. pul. drive. hd. | 36"x14' Bed., o. s., Stone. PRESSES No. 76 Toledo b. g.
No. 2 R. & K. O. B. Inc.
No. 5-A Willard o. b. inc.
No. 15 Toledo, dp, throat,
No. 41A Toledo, horn
of 'Foadick, rad, box. col.
18" Gleason gear gener. No. 33 Toledo, bk. gd.
Wickes 26" tht. punch
No. 1 L. & A. dbl. end,
punch. 14"x1".
158 ton Fireston, ver.hyd. ANEOUS 2" Acme bolt cutter. 10'x12 ga. Ohl, sq. shr. 12x12 Racine hack saw. \*\* Fosdick, rad., Dox. col.
18" Gleason gear gener.
38" & 48" B&Sgear cuts.
Style F. Baker h. d, drill Isl,
69"x14 ga. Bertsch shear.
15-20-40 KW spot welds.
Unice of the collection of the col

#### Fuchs Machinery & Supply Co. Omaha, Nebraska

1102-4 Farnam St., Automatic, No. 52 National Acme, 4 spindle.
Automatic, No. 58 National Acme, 4 spindle.
Automatic, Model G Gridley.
Drill, 2 spdl., Henry Wright, 15" overhang, prod. table.
Drill, 4 spdl. 20" b. g., p. f., V belt motor drives.
Grinder, Micro internal cylinder, m. d.
Grinder, Morton universal tool. Grinder, Micron universal tool.

Grinder, Norton universal tool.

Grinder, Pedestal, 7g h.p., U.S.

Hammers, 25, 96 & 100 b. Little Glant.

Lathe, 11" x8" South Bend, q. c.

Lathe, 14" x8" Sidney, q. c., d. b. g.

Lathe, 18" x8" Chard, q. c., d. b. g.

Lathe, 18" x8" Chard, q. c., d. b. g.

Lathe, 18" x16" Monarch, q. c., d. b. g.

Miller, No. 2 Kempewith universal.

Miller, No. 1 U.S. hand.

Miller, No. 1 U.S. hand.

Miller, No. 6. Garvin plain.

Presse, 0, b. i. Nos. i. 2 3. 5.

Press, No. 6. E Rockford d uble crank.

Press, No. 6. E Rockford d uble crank.

Press, No. 5 to DAG Ferracute, double acting cam.

Shear, No. 2 Ryerson serpentine.

Shear, M. Pexto power.

Shear, M. Smith & Mills, single pulley drive.

Tapper, No. 2EC Garvin vertical.

#### FOR SALE BY

#### The Elyria Belting & Machinery Co. Ohie

Press, No. 294-E Toledo, 22" stroke. Rolls, 10' plate. Shaper, 16" Miwaukee. Shear, 8' power squaring. Turret lathe, No. 4 Bardons-Oliver.

#### Austin D. Lucas and Co.

358 Bishop Ave., Bridgeport, Conn NEED SCREW MACHINES???

We have in stock for rent, four 3" Cleveland automati screw machines with air cylinder, rotary feed, and It" Cleveland automatic screw machine, bar feed, to any individual or firm for only \$25.00 per week pe machine,

## S. M. Regar Machinery and Mill Supplier

Cyl. grinder, Modern Tool Co., 8230 self contained. Grinder, Brown & Sharpe No. 3. Grinder, Brown & Sharpe No. 11. Grinder, Wilmarth & Morman No. 1. Grinder, Cincinnati No. 14. Grinder, Bridgeport surface, 26" wheel. Grinder, Bridgeport surface, 26" wheel.

#### Failor-Strafer Machinery Co. 132 Liberty St., - New York, N. Y.

#### E. L. Klauber Machinery Co. 3221 Olive St. St. Louis, Mo.

Jackes, bench, precision, #", #" & #" collet cap.
Lathes, bench, precision, #", #" & #" collet cap.
Lathe, 13" #5 Davis, semi-q.c.g.
Lathe, 14" #5 Hamilton, with tool room acc.
Lathe, 14" #5 Hamilton, with tool room accessories.
Lathe, 14" #5 Fay & Scott, gap bed, m.d.
Saws, band, metal cotti g, Pacine & Klemm.
Shapers, 18", 20" Ohio; 20" Cincinnati.
Testing machine, Rockwell, No. 5H-40.
Threading machine, Landis 2", single head.
Turretlathes & screw mches., #", #", & 1#" collet cap.

#### FOR SALE BY

#### Lang Machinery Company

28th St. & A. V. R. R.

Pittsburgh, Pa.

Air compressors, Ingersoli-Rand XB-2, 600, 888, 120 & 18-100 ca. ft. 100 lb. pressure, motor drift. Aft comp. 14"x13" Ing. Rand" ER.1".1464 c. I., m. d. Bolt cutter, 1" Landis, 14"-3"sgl. hd., b. d. Bolt cutter, 1" Landis, 14"-3"sgl. hd., b. d. Boring mill, 30" Bridgeport, grd. feeds, m. d. Boring mill, horiz, 34" bar N-B-P, knee type, b. d. Boring mill, horiz, 34" bar D-& H, floor type. Boring mill, horiz, 43" bar D-& H, floor type. Boring mill, horiz, 45" bar Nies, knee type, m.d. Brake, 8"x12 gauge D-& K leat type, a.p.d. Bulldozers, No. 2 & No. 4 Wms. & White, m.d. Centering machine, Whiton, 4", m.d. Column facer, 30" dia. Espen Lucas, b.d. Drill, 3-spindle Woodward-Rogers, m. d. Drill, mulk. No. 3 Rockford 2 apdl., sp.d. Air compressors, Ingersoll-Rand XB-2, 600, 888, 1200 Brake, 5 and gauge.
Brakes, 10, 2 & No. 4 Wms. & White, m.d.
Centering machine, Whiton, 4", m.d.
Column facer, 30" dia. Espen Lucas, b.d.
Drill, aspindle Woodward Rogers, m.d.
Drill, aspindle Woodward Rogers, m.d.
Drill, paill. No. 3 Rockford a spdl., a.p.d.
Drill, mill. No. 3 Rockford a spdl., a.p.d.
Drill, mill. 10 apindle D-12 Fox, b. d.
Drill, adial. 2 Brakes ther, i.a., m.d.
Drill, adial. 3 Bickford, i.a., m.d.
Drill, padial. 3 Bickford, i.a., m.d.
Drills, noright, 11" to 34", b. d. & m.d.
Gear cutter, spur, 30" i16", B. & E., m. d.
Gear cutter, 40" i12" G & E., sp.d.
Gear planer, 36" Gleason, bevel, m.d.
Gearplaner, 36" Gleason, bevel, m.d.
Generator, 100 KW Westinghouse d. c., 125 v. b. d.
Generator, 100 KW Westinghouse d. c., 125 v. b. d.
Generator, 100 KW Westinghouse d. c., 125 v. b. d.
Gerinder, other least on a 2 Cincinnati, m.d.
Grinder, dbl. end, 3" Marachke, m.d.
Grinder, dbl. end, 3" Marachke, m.d.
Grinder, drill, No. 5 Oliver, m.d.
Grinder, contelleas No. 2 Cincinnati, m.d.
Grinder, notol & cutter, logerool inserted tooth, m.d.
Grinder, No. 60 Heald, b. d.
Hammer, power, No. 2-B Nazel, m. d.
Hammer, power, No. 3 Baker, 3", m. d.
Hammer, steam forging, 800 lbs.—6000 lbs.
Hammers, ateam drop, 400-lb, to 8000-lbs.
Hammers, ateam drop, 400-lb, to 8000-lbs.
Hammers, ateam forging, 800 lbs.—6000 lbs.
Keyseater, No. 3 Baker, 3", m. d.
Lathe, 13" 8" Parts Whitney, p. c. g., b. d.
Lathe, 14" 86" Rockford, semi-q. c. g., d. b. g., b. d.
Lathe, 14" 86" Rockford, semi-q. c. g., d. b. g., b. d.
Lathe, 14" 86" Rockford, semi-q. c. g., b. d.
Lathe, 14" 86" Rockford, semi-q. c. g., d. b. g., b. d.
Lathe, 18" 8" Parts Whitney, p. c. g., b. d.
Lathe, 18" 8" Parts Whitney, p. c. g., b. d.
Lathe, 18" 10 "Reafford, grd, head, m.d.
Lathe, 18" 10 "R

Press, hydraulic 28 ton Nat", m.d.
Press, Lydraulic, 180 ton, Watson-Stillman, m.d.
Press, 259 ton Baldwin Southwark 4-post.
Press, Jorging, 1500 ton Farrell-Brimingham, m.d.
Press, Jorging, 1500 tons.
Press, Jorging, 1500 tons.
Profiler, No. E3, Keller, motor drives.
Pump, Worthington 9' x" 12".
Pumch, Jorging, 15" though, 15".
Pumch, 15" tong 15" though, 15" thous.
Pumch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Punch & shear, Cleveland E9, 15" thru 1", m.d.
Saw, band 25" Crascent, tilling bl. 28" x23", d.
Saw, band 5" x8" Racinet, tilling bl. 28" x23", d.
Saw, band 5" x8" Racinet, tilling bl. 28" x23", d.
Saw, band 5" x8" Racinet, tilling bl. 28" x23", d.
Saw, band 5" x8" Racinet, sp.d.
Srew machine, No. 1 W. S. cap, 3", b.d.
Shaper, 24" Cincinnati, m.d.
Shaper, 24" Cincinnati, m.d.
Shaper, 24" Cincinnati, m.d.
Shear, aligator, No. 6! Carlin, 3" round high knife.
Shear, bar, Merada 36" x15" m.d.
Shear, plate, 15" x9" Wheeling, 2ap, 15", m.d.
Shear, plate, 15" x9" Wheeling, 2ap, 15", m.d.
Shear, plate, 15" x9" Wheeling, 2ap, 15", m.d.
Shear, plate, 15" x9" (Briburgh, 2ap, 15", m.d.
Shear, plate, 15" x9" (Briburgh,

#### FOR SALE BY

#### The Nutmeg State Machinery Corp. 1041-1051 State St., New Haven, Conn.

Boring mial, Espen Lucas No. 26, 4" har with ex. table. Grinder, Internal, Taylor & Fenn, self contained, complete, Kxcelo spolle.

Grinder, Bryant No. 38, chucking, 35" swing, motor driven by 3 notors, (3).

Grinder, Ciacinnati, 12".

Grinder, Ciacinnati, 12".

Grinder, Ciacinnati, 12".

Tircad millers, Pratt & Whitzey & wise, motor driven by 3 notors, (3).

Thread millers, Pratt & Whitzey & wise, complete with gears, pumps, tanks, countershafts, (3).

#### Alex Zeeve & Company 2282 Woolworth Bldg., New York, N. Y.

Bolt threaders, 4" Landis, 2" Acme "Class A", lot of

dies.
Boring mills, vertical, 51" Bullard, 2 heads, m.d., 24"
Rogers, spd.
Cylinder boring mill, horiz., 7" bar, swings 96" over bed.
Gear hobbers. 34" Rhenania; 18" Schuchardt-Schutte.
Hammers, power, 500 (2), 400 and 300 lb. Beauty
"'Champion'. 556 lb. Nilse, Barnet, Poul and 56".

"Champion", 80 kJ, we and so lo. Beauty Chambers, 100 kJ, we also be the control of the control

tive Ryerand throatless, four politting, m.d., f capac-tive Ryerand throatless, 66° Yoder rotary, 14 ga. capy. Turret lathe, 2"x26" Pratt & Whitney, b. g., hex turret, with cross-slide.

ALSO MANY OTHER TOOLS.

#### **Davis Machinery Company** 1-3-5 St. Clair St. Toledo, Ohio

1-3-5 St. Clair St.

Brake, 4'x1/16" Dreis & Krump, power leaf type.
Brake, 4'x1/16" Dreis & Krump, power leaf type.
Drill, 36" Rockford, b.
Drill, 36" Rockford, b.
Drill, 36" Rockford, b.
B., & p. f., motor dr.
Drill, 24" Barnes Camel Back.
Filer, No. 3-1 Thiel, filing & sawing, m.d.,
Gear cutter, 45" x12" Gould & Eberhardt, s.p.d.
Gear cutter, No. 3-48 Brown & Sharpe, s.p.d.
Gerinder, 6"x32" Landis plain cylindrical.
Keyseater, No. 2-Mitts & Merrill.
Lathe, 13" x38" Gleanon, st. c. gear.
Lathe, 14% American, c. g., g., d. hd., m.d.
Lathe, 19" as LeBiond, hy. duty, q.c. x., c.p.
Lathe, 14% American, c. g., g., d. hd., m.d.
Lathe, 14% Cincinnati high power, plain.
Mill, No. 5 Becker-Brainard plain
Nill, No. 5 Becker-Brainard plain
Nibler, No. 193 Gray, cap. 1/8" throat, 36",
Planer, 24" x3" x6" Gray, one head.
Press, No., 90-D Toledod, obl. crank, m.d.
Shaper, 16" Newark, b.g. crank, s.p.d.
Sbear, 16" Newark, b.g. crank, s.p.d.

#### FOR SALE BY

#### The Reeve-Fritts Company Chicago

28 N. Clinton St.,

25 N. Cinnon St., Broach, No. 3 horis. belt drive, Drill, 14" Leland Gifford. h. s., t. a. Grinder, comb. 14" cup wheel & disc, Grinder, Gisholt universal tool. Hammer, 160 lb. Little Gisan upright. Lathe, 20" af Flather, b. d. Polishing mach, Blevne, 6" x144" band. Roll, forming, 56" 18 ga. capacity. Saw, cut off, Lees Simplex \$\frac{3}{2}\$ cap. Tapper, No. 1 Garvin vertical, \$\frac{3}{2}\$" cap.

#### W. L. Steege Machinery Co. 548 W. Monroe St., Chicago, Ill.

QUALITY MACHINERY since 1916
Automatics, No. 3A Potter & Johnson, (2)
Porill, radial, 39th American, come drive,
Grinder, Heald, No. 60 cylinder grinder.
Grinder, Bryant No. 6 chucking,
Grinder, Stale Quickway, motor driven, external,
Lathes, turret, Pratté Whitter 3286, hollow hexagon
turret, power feeds to turret and cross slide, (2). Lathe, toolroom, 1826 Crawford, q.c., taper attach, Lathe, 24x14 New Haven, loose change, Mill, No. 2 univ., B.&S., with Cullman dr. & ver. hd. Planer, 28x5 New Haven, m.d. ress, 200 ton Elmes hydraulic. Shaper, 36" Stockbridge, single pulley drive. Shaper, 24" Smith & Mills, cone drive. Shaper, 7" Rhodes, cone drive.

#### Wm. C. Johnson & Sons Machy. Co. 1211 Hadley St., St. Louis, Mo.

Air compressors, 18 in stock, Bolt threaders, 1° 18° & 2° Acme, Brake, press, L&N, 10', 10 ga. Drill, Natco 13 spindle, No. 1 taper, Drill, No. 2 For, 6 spindles, Drills, radial, Dreses, 3' & 4'. Drills, radial, Fosdick, 3'. Drills, radial, Fosdick, 3'. Drills, radial, Fosdick, 3'. Forging machine, A jax 2". Grinders, 10"x30" Landis. Grinder, Walker 12" rotary. Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Grinder, wainer ze Tourry.

Hammers, 300 lb. Beaudry, 78 lb. Bradle
Little Giant.
Lathes, 14"x8' Monarch, q.c.g.
Lathes, 14"x8' Monarch, q.c.g.
Lathes, 14"x8' American, q.c.g.
Lathes, 18"x8' American, q.c.g.
Lathes, 28"x18' Lodge & Shipley, q.c.g.
Lathes, 24"x18' Lodge & Shipley, q.c.g.
Lathes, 24"x18' Lodge & Shipley, q.c.g.
Lathes, 32"x14' Schumacher & Boye.
Lathes, 32"x14' Schumacher & Boye.
Lathes, 32"x14' Schumacher & Boye.
Lathes, 32"x18' Lodge & Shipley, q.c.g.
Lathes, 32"x18' Lodge & Shipley, q.c.g.
Lathes, 32"x18' Lodge & Shipley, q.c.g.
Lathes, 32"x18' Kiles Locomotive wheel,
Miller, No. 3 Kempamith.
Miller, No. 3 Keight vertical.
Miller, No. 3 Keight vertical.
Miller, No. 3 Keight vertical.
Miller, No. 48 Fox.
Pipe machines, 2" Landis.
Pipe machines, unches, shears, buildozers Roll, plate straightening, H. & J. No. 2, like new, Saws, 6x6 Peerless, 13x15 Racine. Scrap baler Logeman hydraulic. Shaper 12"—16"—30"—24".

Large stock guaranteed electric motors. Any size,

#### FOR SALE BY

#### D. H. Prutton Machinery & Tool Co. 5295 W. 130th Street, Cleveland, Ohio

Air compressor, 50 cu. ft., Allis Chalmers, m. d. Bolt pointers (two), Economy 4"
Box printer, single color, Hall & Brown.
Broach, No. 2 Lapointe, 2 spindle.
Chucks, 33-6"x3" Heald magnetic.
Chuck, 1-12"x48" Heald magnetic. Chuck, 38-6"x8" Heald magnetic.
Chuck, 1-12"x86" Heald magnetic.
Drill, 4 spindle Demco, b, b, p, f, single pulley drive.
Grinder, disc, No. 50 Gardner, m. d.
Grinder, disc, No. 50 Gardner, semi auto., with fixture
for grinding edges of electric iron bottoms.
Grinder, disc, No. 12 Gardner.
Grinder, disc, No. 12 Gardner.
Grinder, disc, No. 12 Gardner.
Grinder, disc, No. 12 Gardner, m. d.
Millers, (two), No. 13 B. & S.
Pipe threader, 4" Bignell Keeler.
Pipe threader, 4" Bignell Keeler.
Planer, 38x38x16 Woodward & Powell 1 head on rail.
Plate, polisher, No. 27L Excelsior, m. d.
Press, No. 1 Blins cam drawing, s. s.
Press, No. 1 Bins cam drawing, s. s.
Press, No. 2 Gardner, m. d., less motor.
Manville four side, hand feed, cap, kyl.
Tappers, vertical (two), 5 spindle Webster & Perks,
Tappers, 0.2 Garvin.
Tappers (two), 8/8" kickert Schafer,
Thread roller, 3/8 Waterbury.

#### FOR SALE BY

Joseph Hyman & Sons, Tioga and Almond Sts., Philadelphia, Pa.

Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES
No. 4 United Eng. & Fdry., 4 crank, 156" between uprights, 8" dis. crank 73" stroke, weight 118090 lbs.
No. 6B Ningara, dbl. crank 24", crank 3".
No. 108 Z&H. double crank 42", crank 3".
No. 108 Z&H. double crank 42", crank 5".
No. 584 Consolidated, geared.
No. 596 Blins apa, double crank presses.
No. 574 Eliss straight side.
No. 34B Blins straight side.
No. 34B Blins trangle.
No. 18 J&J. GE Blins tongle presses.
Nos FAS Ferracute horning.
No. 34 Blins promise, grd.
18 ton Eds. 4 Esl Ferracute.
19 ton Waterbury Farrel, coining.
No. 23 Blins, 256 ton, knackle joint.
18 ton Eds. 25 Ferracute, hnuckle joint.
No. 9C Badger State combination punch. No. 9C Badger State combination punch & shear. No. 6 Hilles & Jones multiple punch. Punches & shears, single & double end. quaring shears, various sizes. ese and hundreds of others of popular makes and sises, are in stock at our warehouse here.
Rebuilt and Guaranteed.

#### West Penn Machinery Company

West Penn Machinery Company
Air compressors, 30 to 260 cubic feet.
Air compr. portable gas 1-R 160 cu. ft.
Blower, No. 4 Roots, capacity 3110-c. ftm.
Bolt cutters, 15' 2" & 3" Acme, b. d.
Bolier, 48 h.p., Tituwille 110 lb. pressure.
Boring mill. 34" Colburn, turret bd., b. d.
Bulldozers, Nos. 2, 4, 6, 9, 23, & 30.
Crane, 5 ton alliance, 35' span.
Crusher, jaw. No. 4 Champion, b. d.
Die filer, No. 3 Thiel, m. d.
Drill abarpener, Ing. Rand "Leyner", 14".
Drill, radial, 5' American, semi-univ., b.d.
Drill, No. 218 Baker, No. 5 M. T., b.d.
Engine, gas, 20 horse power Bessemer. Drills, upris ht 10" to 38".

Drills, upris ht 10" to 38".

Drill, No. 218 Baker, No. 5 M, T., b.d.,

Engine, gas, 30 horse power Bessemer,

Gear cutters, 11", 18" & 44" Gleason,

Gernder, the period of the control o

#### 1210 House Building.

#### Pittsburgh, Pa.

iaws, friction, Nos. 2,3 & 4 Ryerson motor drive, aw, metal band, Laidlaw, m.d. 

#### FOR SALE BY

#### Sterling Machinery Corporation 411 Southwest Blvd., Kansas City, Mo.

Lathe, Potter & Johnson No. 5A turret lathe. Motors, electric, used, various sizes, both AC & DC. Write for prices and specifications of above items.

#### North Machine Tool Corp. New York, N. Y. 1790 Broadway

GENERAL LIST Gear generator, 18" Gleason straight bevel. Grinders, 10"x24" Landis, direct m d. plain, cyl.; No. 12 Bown & Su. pe. plain cyl.; No. 2 B th universal. Lathes, 18"x6' American arr. for m.d.; 20"x8' Monarch.

Latines, so as cameros.

q. c. g.
Milling machines, 2B Hendey plain, arranged for m.d., electr. high speed head; No. 2A Eccker vertical, m.d.; No. 4 Cincinnati plain,
Radial drill, 3 Bickford,
Sawing machine, No. 6 Cochrane-Bly, metal saw,
Turret lathes, No. 1 Warner & Swasey; No. 2 Foster screw machine.
PART'AL LISTING ONLY—SEND US YOUR INQUIRIES.

#### Russell Machine Co. 438 Oliver Bldg. Pittsburgh, Pa.

438 Oliver Bldg.

Boring mill, 42" Bullard, 2 swivel heads, b. d.
Boring mill, horiz. 3-3/8" bar D&H, floor type.
Boring mill, horiz. 5" bar Barrett, b.d.
Gear planer, Bevel, 34" Gleason m.d.
Gear planer, Bevel, 34" Gleason, b. d.
Hammer, No. 2" B" Nazel Power Hammer, m. d.
Hammer, No. 2" B" Nazel Power Hammer, m. d.
Hammer, 1800 lb. Bias board drop.
Lathe, 42" 217" 6" Pond, p.c.g., triple grd., b.d.
Lathe, flat turret, 24" x24" Z&L, grd. hd., s.p.d.
Planer, 35" x35" x14" Gray, 4 heads, b.d.
Punch, multiple, style "E" L&A 183" th. cap. 340 tons.
Punch, beam, Cleveland, cap. 24"
Shaper, 24" Cincinnati, m. d.
Shear, Alligator, No. 61 Carlin high knife, 24" sq.
Slotter, 18" Bem. Miles, table 36" dia., b.d.
Upsetting machines, 23, 34, 4 and 3" Ajaxiron bed. Slotter, 18" Bem. Miles, table 36" dia., b.d. Upsetting machines, 2‡, 3‡, 4 and 5" Ajax iron bed.

#### S. M. Regar Machinery and Mill Supplies Tampa, Florida

Boring mill, Bickford, hor. spd., g. b., tbl. type No. 232, Boring mill, Binsee No. 78 hor. knee type, 32 spindle. Boring mill, Niles 36" 2 swivel heads. Drill, Barnes upright 26" 3 spindle, one tapping att. Boring mil, Allies and Drill, Barnes upright 20" 3 spindle, one tapping att. Drill, Sigourney 4 spd. also various other upright drills. Drill, radial, 5" Harrington.
Drill press, Foote Butt 24", heavy duty.
Hammer, Lingle 50 lb, power, arranged m. d.
Hammer, Little Giant 50 lb, power.

Hammer, Little Giant 50 lb. power,
Keyseater, Morton 40°.
Lathes, LeBlond 17° & 19° rapid prod. q. c. feeds, (3),
Lathes, National 18° production, (3)
Lathes, Gisholt, 24°, hole in spindle 8°.
Lathe, Bement Miles, 1, c. g., 38° factory raising
blocks to 42°, centers 17°, bed 22°, c. d.
Lathe, Bullard 22°, Loose change, turret head.
Lathe, Mueller 20° quick change, 4 way tool post,
Lathe, Jones and Lamson 2kr24°.
Miller, Bement No. 68 rigid.
Pipe machine, Jarceki No. 15, 23 to 16°.
Pipe machine, Jarceki No. 15, 23 to 16°.
Pipe machine, Jarceki No. 15, 23 to 16°.
Saw, cold, Higley m. d. No. 27, 36°, takes 38° blade,
Slotter, 16° Niles, circular table 36°.

#### FOR SALE BY

Lloyd Machinery Inc.

150 Broadway New York, N. Y. Borer, vertical 42" Gisholt, table diam, 38", m d, Gear generator, 11" Gleazon, auto, bever, s.p.d. Grinder, 94" D. Limond, wheel diam, 36", m.d. Planer, 66", 460", 131" Cincinnati, dbl., std., 3 hds., m.d. Slotter, 24" Newton, table diam, 42", m.d.

#### Machine Tools Sales Company 513 N. 17th St., Philadelphia, Pa.

Transcrine 1 0015 Sales Company

513 N. 17th St., Philadelphia, Pa.

511' Isaya10 Chi. pneu. O-CB, mr. dr.

Auto. 2f-24' Model A Cleve. Ser. over 33,000.

Auto. 18' Model A. Cleve., Ser. over 30,000.

Auto. 18' Model A. Cleve., Ser. over 30,000.

Axie lathe. Bridgeford, dbie. end, center dr., q.c.g.

Bor., No. 3, 8' bar Barretthor., cyl., m.d.

Drill, radial, 8' Sellers, m.d.

Grinder, 10' 328' Landis pl. self-cont.

Grinder, 10' 328' Landis pl. self-cont.

Grinder, 10' 328' Landis pl. self-cont.

Grinder, 74' 83 16' Sichul. ho.

Lathe, 26' 88' Sichul. ho.

Lathe, 33' x17' New Haven, c. d.

Lathe, 33'' x17' New Haven, c. d.

Lathe, 33'' x16' Centers Fifield, triple geared.

Lathe, 37'' x16' Centers Fifield, triple geared.

Lathe, 27'' x38' Lodge & Shipley, m. d.

Lathe, 20'' x8' Prentice, gd. hd.

Lathe, 20'' x8' Prentice gd. hd.

Lathe, 20'' x8' Prenticel mig., (2).

Lathes, 18'' x8' LoSwing, s. p. d.

Miller, Mo. 34, 72' Pratt & W. dble. spdl.

Miller, Mo. 34, 72' Milled Screw Co.

Planer, 68'' x9' LoSwing, s. p. d.

Miller, thd. 11'' x24' Milled Screw Co.

Planer, 68'' x9' No. & Hilles & J., plate.

Saw, No. 510 Newton, motor drive.

Saw, Pecrleas \*(x6'' hold this. J. in Just.

Saw, Pecrleas \*(x6'' hold this. J. in Just.

Saw, No. 510 Newton, motor drive.

Saw, Pecrleas \*(x6'' hold this. J. in Just.

Tucks, 8600 lb. cap, Tier Lift Tracks, Baker, Automatic Tracks, 8600 lb. Lakewood \*(4). Triplex pump.
Trucks. 6000 lb. cap. Tier Lift Trucks, Baker, Automatic Transportation, Lakewood (4).

#### Reliance Machinery Sales Company 1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 139 and 450 cu. ft. Air compressors, 139 and 450 cu. ft.
Brake, press. 6'x16 ga. Robinson, toggle,
Grinder, 12x32' Bath univ.
Grinder, No. 14 Braley double disc, 26' discs.
Hammers, 250 and 400 lb. Bradley helve.
Hammers, 250 and 400 lb. board drop.
Lathe, 36''x18' New Haven, plain change.
Lathe, 27''x15' Prentice, taper, arr, m. d.
Miller, 30''x16' Newton slab, m. d.
Press. No. 82-C Toledo dbl. crank, 44" wide, 5" shaft,
2" stroke, m. d. stroke, m. d. 2" strone, m.

2" strone, m.

34" head, m. d., 3-60-220 v.

34" head, m. d., 3-60-220 v.

Punch, 46" throat Whiting, !" thru !", arch. jaw.

Shaper, 25" American, b. g. crank, cone.

Shaer, No. 652 Nisgara, 52"x16 ga., 15" gap.

Slotter, 15" Bement, crank, 36" rot. table.

Swaging machine, No. 5 Etna, cap. 3" tubes.

Swaging machine, No. 5 Etna, cap. 3" tubes. Goulds centrifugal, 3 stage, 250 g.p.m. against What do you need? What have you for sale?

MACHINE TOOL BLUE BOOK

OCTOBER 1941

#### FOR SALE BY

Nesbitt Machinery Co. Baltimore, Md. 110 E. Pratt St.,

Planer, 22' plate, motor drive. Guillotine shear, 6"x6" cap. Hilles & Jones.

#### Wiener Machinery Co. New York City 237 Centre St.,

Low Priced Machines
Gear cutter, 4x48° Brown & S., m.d., \$450.00.
Gear cutter, No. 12 Brown & Sharpe, m. d., \$450.00.
Grinder, No. 12 Brown & Sharpe univ. tool & cutter.
Lathe, 24x10 Hendey, raised to 32°.
Radial drill, 24' Morris, s. p. d. thru gear box.

#### Box 166 c/o Hitchcock Publishing Co. Chicago, Ill. 508 S. Dearborn St.,

PLANT FOR SALE
25 miles of Detroit, 6000 square feet, 40 employees,
mfg. auto parts and tools. Lathes, screw machines, mills, shaper & drills all motor driven (40 machines) Price: building and equipment \$35,000.00.

#### Factory & Mill Supply Co., Inc.

176 Federal St., Boston, Mass.

Milling machine, No. 2-M Potter & Johnson, auto. Pipe machine, 18" Jarecki, m.d. Planer, 48"x48"x12" Betts, 3 heads, m.d. Planer, 60"x60"x12" Pond, 2 heads, m.d.

#### C. R. Daniels 1514 W. Capitol Drive, Milwaukee, Wis.

Blue printing machine, Pease vertical. Grinder, No. 55 Heald internal. Lathe, 24"x12" Lodge & Shipley. Press, No. 5 Greenerd, arbor. Spot welder, 72 KW Acme, 12" horns.

#### Publix Metal Goods Corporation 159-61 West 25th St., New York City

Eyelet machine, Shipley, 3 plunger, tight and loose pulley drive, roll feed. In good condition. Machine available for inspection in our plant.

#### B. D. Brooks Co., Inc. 119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment. Apron brakes, press brakes, shears, folders. Bending rolls, corrugating rolls, forming rolls. Punches, beaders, rotary machines, stakes, etc.

#### Long Machinery Co. 852 Summer Street, Boston, Mass.

Cam-cutting machine. Lodge Davis. Cutting off machine, Hurlburt Rogers 4". acceld. speed. Grinder. Landis No 2 universal, 12"x32". Radial, Lodge Davis 4". Planer. Whitcomb, 30"x10, 2 heads.

## WANTED

#### TAPS-TWIST DRILLS-FILES CUTTERS-ENDMILLS-SAWS HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

### WESTERN TOOL EXCHANGE

18 N. Halsted Street, Chicago, Illinois SURPLUS BOUGHT AND SOLD

#### D. E. Dony Machinery Co. 47 Laurelton Rd., Rochester, N. Y.

Broaching machine, La Pointe hydr. 5-ton, 38" stroke, double ram, surface, m.d.
Drill, 4-spindle, Demco 12" overhang, m.d.
Gas cutting machine, No 7 Oxygraph. Press, No. 734 Bliss, s. s. geared.

#### Manufacturers' Sales & Distributing Co. 5005 Euclid Ave., Cleveland, Ohio.

Sanding discs, large quantity, fibre combination, 68 grit, 72 & 92" with 2" hole. Very low price on quantity.

#### Box 168, c/o Hitchcock Publishing Co. 508 S. Dearborn St., Chicago, Ill.

FOR SALE—COMPLETE MACHINE SHOP Die heads, 2" style D Geometric, Modern style H No. 5, No. 2 Hartness.

No. 5, No. 3 Hartness.
Drilling machines, SS, Garvin, double end, (2).
Drill presses, bench to 26"
Lathes, 24" & Lodge & Shipley, q.c., cone dr., hollow spindle, compound rest, p.f. turreton ways.
22" 118" Nies, standard change, c. d., compound rest, hollow spindle.

x6' Shumacher-Boye, s. c., compound rest, c.d. 'Lo-Swing, 80" between centers, sgl. pulley dr. Furret lathe, I

Drills, taps, reamers, face plates, miscellaneous tools and supplies,

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#### Special Machine Tool Engineering Works 254 Canal St., New York City

PRODUCTION LATHE
9" Porter-Cable or Lipe.
Send photographs and literature.

#### W. C. Lipe, Inc.

Syracuse,

#### WANTED

Cleveland Milling Machine Company relieving lathe-worm gear spindle drive, selective spindle speeds, change gear mechanism for indexing, adjustable re-lief stroke and carriage, compound slide. Tailstock not necessary.

N. Y.

### **GOOD TOOLS** FOR SALE -No. 2 M. T. Drill, Foote Burt No. 24, 24" Heavy Badial Drill, 2' Foedick, M.D. Radial Drill, No. 7, 4' Prentice M. D. Grinder, No. 2 Landis Univ., 12"x30", Belt Drive Belt Drive Grinder, 12"x24" Plain B.D. No Name. \$250. Grinder, 16"x96" Safety, M.D. 26" Grinder, Disc, Besley No. 8, 20" discs, two Miller, Plain Head, Power Feed, 6x30 Table, .....\$1150. . . \$250.

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Kedzie 0212

#### 60" wide x 11' Planer.

L. W. Pond Machine Co., Worcester, Mass. manufacturer - size 60° wide x 11'; has two heads; is in first-class operating condition and can be seen in operation.

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Lathe, Fay-Scott 328x141, 2 chucks, 5 H P. \$1475. motor ... Lathe, Porter 24"x18", dbl back gd. 2-6 station turrets, 14 jaw chuck, 2 face plts...\$1375. 

Planer, American Foundry & Machine Co., 36"x36"x12' openside 10 H.P. mtr. \$5850. Vertical Boring Machine, Pond 80° excellent shape, 4 Mill jawa...... \$8750.

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Broach-LaPointe No. 1 rebuilt. Grinder-Landis Universal, No. 11/2. Planer-Wheeler, 24x24x6 ft., 1 head. Planer-Bertell, 26x26x7 ft., 1 head. Shear-Massillon bar shear, 7x20" throat. Turret Lathe-J. & L., 3x36. 20-Gasoline and Electric tow and lift trucks for immediate delivery-many makes.

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#### SELLING FOR CUSTOMER CAN BE SEEN IN OPERATION

Milling Machine: No. 2 Cinc. all grd. hd., S.P.D., Ser. No. 4475-S; full univ. equip. incl. div. head, vise, gears, arbors, vert.

incl. div. head, vise, gears, arbors, vert. and slotting attachments
Lather 20"x8" Monarch Q.C.G., D.B.G., Ser. No. B189-17, dobt fric. c/s; 14" 4-jaw indep. chuck, 20" face plate, steady and follow rest and centers
Drill Press: New Albany Toolroom B.B. Drill Press, ½" cap., fric. drive, with ½" Jacobs chuck

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**Under Writers Fire Pump** 18-10-12-1000 gal. per minute. Steam driven.

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INDEPENDENT CHUCKS 4 JAW, all sizes 41/4" to 36" Diameter.

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rebuilt

RIGIDMIL-SUNDSTRAND No. 30 hydraulic feed, table 72x148, high-speed spindle with 2000 r.p.m. motor in base.

AUTOMATIC - BRIDGEPORT open-side planer, s.p.d.

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No. 2 Baker Keyseater, 21 cap. 20' Grob Die Bandsaw, M. D. No. 3 Lees Bradner Thread Mill. 11/2" Acme Turret Lathe, GFH, barfd. 14 x61 Hendey Toolroom Lathe, motorized.

No. 7 B. & O. Turret Lathe, G. H., 41/41 H. S.

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#### CAN BE SEEN IN OPERATION

Landis 16"x66" Pl. Cylindrical Motor Driven Grinder. Ser. No. 5056
Van Norman, No. 2 Relio Grinder, Motor Driven, Serial W504.

Whitcomb Planer, 18'x18'x5' with 1 Head, countershaft, arranged for Motor.

Hutto 8' Radial Arm Cylinder Honing Machine Motor driven with variable speeds and 20 sets stones. Ser. No. 1062 Hannifin 20 Ton Hyd. Arbor Press with self cont. Mtr. Dr. & pump. Ser. No. 3986

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## GOOD TOOLS? — SEE US

D-31 Fox multiple drill, rectangular head, 18"x31\\'2" spindle centers. No. 2 Morse taper;
10 spindles, hand and power feed to head.

AUTOMATICS, 51/2 Model A Cleveland; %-1/2 & %" Model B

BOLT CUTTERS, 2" Landis.

DIES and MACHINES for rect. cans, inc. 61 Ams flanger; 72 Ams double seamer; 126CD Adriance double seamer; 281 Adriance gang slitter; No. 114 Adriance Automatic Double Seamer 10" round cons.

DRILLS, 36" Cincinnati, back geared sliding head, tapping attachment; No. 4 Quint six spindle turret drill; No. 4 Morse tapers

DROP HAMMER, 300 lb. Standard Auto.

ENGINE LATHES, 22"x10' Davis dble. back gear quick change; 14" 8 Monarch, plain change; Four 9"x20" Porter Ca-ble Production lathes with back facing attachment.

MILLING MACHINES, No. 3½ Pratt & Whit-ney duplex, 60" table, 27" extreme be-tween spindles; No. 1 Newton slab, 65" table feed.

TURRET & MONITOR LATHES, 1 3"x36"
Jones & Lamson; No. 1 Am. Tool & Mach., Fox Monitor chasing bar.

PLANERS, 24"x6' Pond, one head: 36"x15' Betts two heads.

PIPE MACHINES, 3" Bignail & Keeler; 4" Saunders; both belt drive.

PRESS, No. 5 Marshalltown O.B.I. Press, stroke arr. for Motor CRANK SHAPER. 20" Walcott B.G.

SAND BLAST, C-36 New Haven 36"x44"
Radial Sand Blast Barrel M.D. SEPARATOR, Large Oil Separator, with

hoist; 3 McKenzie chip production WIRE STRAIGHTENER, 1/4" Shuster, 10 ft.

Cutoff Many other tools-exceptional "buys"-write for full details.

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Established 1894

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AUTOMATICS:

7/8" Cleveland "B" ser. 32543 11 Cleveland "A" ser. 25781 21 Gridley "F" 4 spindle 8021 2" Nat. Acme "B" 4 spl. 13197 42 Cleveland "A" ser. 17258

8'x14 ga. Hand Bending D&K 8'x18 ga. Hand Bending D&K 3'x14 ga. Box & Pan D&K 5'x14 ga. Box Pan D&K

SHEARS:

9HEARS:
10'x3 Wais & Boos, 24" Gap
8'x3'16 Bliss 18" Gap
8x14 ga, Stoll
4'x3'16 Ningara No. 748
6'x18 ga, Stoll 15" Gap
No. 0 Buffalo Bar Shear 14"
Rd. Cap, 1" Sq. 2\pm x2\pm x4
Angles 2\pm x4" Flats 24" Gap No. Rd. Angles Pels Hand Univ. Iron Wkr.

DRILLS:

Foote-Burt No. 21 Hy. 18" sp. tr. Cin.-Bick. 28" with Tapping Baker No. 216 Split Column Snyder 36" 28" 24" Barnes 24" 21" B. G. P. F. Sliding Heads Aurora 24" B. G. P. F. Sl. Hd.

BORING MILLS:

3" Bar Universal Horizontal, Table 24x48, Motor Driven 3 Boring Bars, Perfect condition 36" Bridgeport Vertical, 2 heads 42" Colburn Vert. 2 heads, Driver Trayerse. Power Traverse

AIR COMPRESSORS:

AIR COMPRESSORS:
4 jx4 j DeVilbis Vert. Water
cooled, (2) 6x6 Bury Höriz;
6x6 Curtis Twin Vert. water
cooled; 9x8 Blaisdel Horiz;
10 x8 Laidlaw borix; 12 x 10
Ingersoll-Rand, E R I, Horiz;
10x8x4 American Tandem 250
ib. Press cap. with intercooler.
(2) 14x12x10 American 2 Stage
with Intercooler, 500 CFM

BULLDOZER: No. 4 Williams & White

PRESSES:

No. 166 Consolidated, Dble. Cr., Bed 40x36 6" stroke, Marquette Cushions; No. 5 American Str. Side 75 tons, 3" stroke; No. led 40x38 6" stroke, Marquette Cushions: No. 5 American Str. State 75 tons, 3" stroke; No. 371 Bliss, Straight Side; 75 tons, 4 1" stroke; No. 21 tons, 4 1" stroke; No. 21 tons, 4 1" stroke; No. 21 No. 19 No. 20 No. 20 No. 21 No. 19 No. 20 No. 20 No. 21 No. 19 No. 20 16 Bliss Horn, M.D. No. 1 Bliss Toggle, 3 tons General Flex, 12 Ton Fox Flex, No. 75 Toledo Pl. No. 75 Toledo Geared, No. 6 Waterbury O.B. No. 3B Marquette, Geared, air cushion, No. 5 Greenerd Broach

DRILLS—Sensitive
High Speed, Ball Bearl 7:
6 Spindle Aver No. 2
4 Spindle Aver Lehand Giffo.
Foute-Burt No. 2 (8)
Spindle Aver No. 2
5 Spindle Aver No. 2
5 Spindle Aver No. 2
5 Henry,
Wright No. 2, Edlund No. 26,
Foote-Burt No. 2
6 Spindle Aver Fosdick L & G
Stop, H&W Edlund, No. 0
No. Mo. 25, 5
New Drills in Stock 1

DRILLS-MULTIPLE:

Natco No. 11-8 spindles Fox No. 2-8 spindles Harrington 12 spindles, for 20, like new spindles, drilled

RADIAL DRILLS:
3' Bickford, 3' American, 3'
Dress 3' Mueller,
3' Silver, 4' Dress, 4' NBP
Semi Universal
Bearing, Sensitive, M. D.

28" G&E "Invincible" (2) 24"
G&E cone, 24" G&E, spd.
26" Smith & Mills, 24" Cincimnati, 24" Stockbrothechnati,
16" Smith & Mills, 24" Cincim16" Smith & Mills,
15" Steptoe, 15" Fotter & Johnson, 16" G&E Motor Driven
Hendey Friction, 20" Onio
16", 14" G&E

42"x15' Pend triple G 24"x16' Greaves-Klusma 26"x12' Crawford-Eric Geared, Crawford-Erie, 20"x8' American, 20"x10' Da M.D American, M.D.
"x10" Davis, 21"x8' LeBlond
with Turret on Carriage
xx8' LeBlond Heavy Duty Production, 18x8 Mueller
xx8 Chard 18x8 Cisco, 18x8 Hamilton 18x12 Hamilton, 18x12 Prentice 17x8 Sidney Sidney Cincinnati Taper, 16x8 Cincinnati Cincinnati ix10 Reed Prentice; 16x8 Reed 16x6 American Inside lead screw 16x6 American Geared 16x6 American Cone Ser. 42346, 16x6 Pratt & Whitney 16x6 Lodge & Shipley Geared Head, 16x6 L&S cone 16x6 Mouarch, 14x6 Bockford Head, 16x6 x6 Monarch, 14x6 LeBlond

Partial List Only. Send Us Your Inquiries.

14x6 Standard Lathe works 14x6 x6 Greaves & Klusman 13x6 Mulliner-Edlund 14x6

13x6 Willard Geared Head, 12x5 Mulliner-Edlund 10"x44' Pratt & Whitney Tool-

Mulliner-Edlund
6"x44" Pratt & Whitner Toolmakers Lathe, Taper Attachment Bray Bar & 7 Collets,
8"x36" American Watch Co.
Precision Beach Lathe, compound, Collets, etc.

MILLING MACHINES:

and Die Sinker

THREAD MILLER:

6x14 Pratt & Whitney 4" P&W Spline Miller (2) 2" P&W Spline duplex Miller

GEAR CUTTERS

48" Gould & Eberhart No. 12 Barber Colman 18" Schuchart & Schutte Whiten Automatic Spur;

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No. 6B No. 54B H.D. No. 4A No. 4A M.D. No. 3A H.D. No. 2A No. 14B Rochester High Speed Hammer

No. No. lb. Co.
No. 3R Marquette Riveting Press
No. 0 No. 80 Grant
15 lb. Bradley Upright 50 lb.
DuPont Upright
400 lb. Miner & Peck Relt Drop
200 lb. Bliss Board Drop, Poppet

PIPE MACHINES:

2" Chicago Motor Dr. 2"
Jarceki 2" Landis, 4" Curtis
6" Willians "Rapiduction" 6
Jarceki 12" Saunders, Bolt
Threaders, 1½ Landis double head
1½" National Geared Head, dble.
2½" Acme, full set dles

FALK MACHINERY COMPANY IN WARD STREET R. N.Y.

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#### IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSORS 355 cu. ft. 12"x10 Ingersoll-

55 cu. ft. 12"x10" Ingersoll-rand Class ER-1 B.M. Drive 100 lb. Pressure 14 cu. ft. 14"x14" Chicago Pneu. Class NSB, B.D. 100 lb. Pressure 574 cu. ft. Pneu. Class lb. Pressure

BENDING ROLLS 10' Bertsch, M.D. Cap. 4" Plate 10' Bertsch, M.D. Cap. 4" Plate

BORING MILLS—HORIZ.

5" Bar P & H Boring, Drilling & Milling Machine, Arr. M.D.

5'x247' Steel Building

BULLDOZER No. 7 Ajax. Motor Drive. Face of Crosshead 12"x76". Stroke 16" No. 8 W & W. Motor Drive. Face of Crosshead 204" x 108", Stroke 24"

CRANES ton P & H Span 220/3/60 A. C. ton Bedford 22'6" 67'2" ton Bedford
Span 220/3/60 A. C.
1 ton Alliance
Span 220/3/60 A. C.
20/3/40 A. C.
1 ton Toledo
32'34" 10 10 10 ton Toledo 32'3½"
Span 220'3'/60 A. C.
15 ton Niles
Span 220'2'/60 A. C.
Including Phase Changer
15 ton Niles
Span 230 Volt D. C. 20 550 ton Case Span Hand Operated 25 304

Span Dates ton Niles Span 230 Volt D. C. ton Niles Span 220/3/60 A. C. 5 ton Auxiliary DRILL-RADIAL Plain Radial Drill. 12" dia.

30'6"

column FORGING MACHINES Ajax, Nat. Acme St. Fr. to 7 HAMMERS—BOARD DROP-STEAM DROP-STEAM FORG 1000 lb. to 8000 lb. Chamb.

00 lb. to 8000 lb. Chamb. & Sp. Erie. N-B-P Morgan JOGGLING MACHINE tilles & Jones Plate Joggling Ma-chine, cap. 1" plates 42" from edge or 1" plate 12" from edge. Arr. for M.D.

ATHE
2" x 28' Wickes Heavy Duty
Screw Cutting Engine Lathe,

LEVELLER-HYDRAULIC 48"x12' Britten Hydraulic "x12' Britten Hydraulic Hor-rizontal Sheet Stretcher Level-ler, Motor Driven. Complete with triplex hydraulic pump. 50" McKay Motor Driven 17 Rolls 4-1" Dia. 30,000 lb. RIEHLE BROS.

LEVELLER-ROLLER

UNIVERSAL TESTING MACHINE Motor Drive

8000 Ib. MORGAN STEAM FORGING HAMMER Double Leg

100" WILLIAMS WHITE OUBLE CRANK PLATE SHEAR & MULTIPLE PUNCH DOUBLE Motor driven with electrical equipment

134" CLEVELAND NO. 6 Double Crank Plate Shear & Multiple Punch

or driven with electroquipment 12" Shaft

NO. 96F TOL TOLEDO 124" Uprights 12" Stroke
Tie Rod Construction
Complete with 40 H.P. Motor

MILLING MACHINE-PLANER "x42"x16' Ingersoll Face Adj. Rail Planer Ingersoll Single

PIPE MACHINES Landis, motor driven, complete with cutting 0" attachment and chamfering attachment Standard Engineeri ttachment Engineering Co.

8" Standard Engineering Co. Pipe Threading and Cutting Machine, arr. for M. D. 16" Williams Pipe Threading Mch. M. D. HYDRAULIC

FLANGING Southwark Hyd. Section-anging Press. 2 Vert. 200 ton al Flanging Press. 2 Ver rams, 1 horiz. clamping ran 1 stripper ram, Table 54"x72 Vert.

PRESS-DOUBLE ACTING TOGALE

162 Toledo Punch Press. Bed
Area 21" x 21". Stroke of
Blankholder 5", stroke of

Plunger 81"
No. 408-A Bliss Double Crank,
Bed Area 72"x50", Stroke 15"

PRESSES-SINGLE ACTING-

1661 Consolidated, 6" stroke 47" between Uprights
10-C Bliss, 6" Str
between Uprights Stroke 84"

PRESSES MISCELLANEOUS
1 D-45 Ferracute Press. Horizon-tal Double end screw type 36"

ram stroke

6 Bliss Horizontal Reducing

Press B. D. 8" stroke

5 856 Toledo, rack and pinion

press, Stroke around 5" to 36"

Bed area 22"x22"

PUNCH—HORIZONTAL
No. 2 Hilles & Jones, Arr. M.D.
Cap. punch 1" thru 1"

PUNCH 4 SHEAR COM-BINATIONS No. 6 Whiting Arr. M. D. 36" Throat, Cap. Punch 2" thru

No. 14½ Williams & White, Arr. M.D. 36" throat, Cap. punch 1" thru 1" Style E Clev. Sgle. End Arr. for M. D. 27¼" throat Cap. Punch 1" thru 1"

ROLL-TAPER FORGING No. 2 Ajax Taper Forging Roll

ROLLING MILLS 10x9" Acme Four Stand 2 High 10"x12" UE&F Co. Sgle. Stand 2 high 16!x22" Cold Strip Mill 2 stand high 38 Farrel Sgle, Stand 3 high rod mill Garrison Bar Mill 5 stand 3 16" G Garrison Bar Mill 3 stand e 3 high and one 2 high Machintosh Bar Mill 2 stand 24" 3 high 28" Mesta Sheet Mill steel Housings

SAW " Mackintosh Hemphill Tilting Frame Hot Saw Motor Driven Capacity 8"x8" Blooms

SHEAR-GATE " Morgan. Arr. for M.D. Ca-pacity plate 11"

STRAIGHTENERS

I" Shuster Wire Straightening
Machine, M.D. 20' cut-off

a" Shuster Automatic Wire
Straightening Machine, arr. for
M.D. 14' cut-off
Shuster Shane Straightening Machine, M.D Cap. 1" hex.

TESTING MACHINE 50,000 lb. Olsen Four Scre Type Universal Testing Ma-chine, Motor Driven

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## EMCO REBUILT

GEARED HEAD ENGINE LATHES 22"-100 H.P. American Super Lathe, 4 m.d., for carboloy 14"x6' Lodge & Shipley Selec. Hd., taper, Cisco, m.d., collet attach. 16"x8" Reed 16"x8" Reed 18"x8' American, m.d., taper 18"x10' American, m.d., taper 18"x15' Lehmann, m.d., taper 20"x18' American, m.d., taper 20"x14' Hendey, taper 24"x86" Bridgeford 24 x8 o Bridgetor 24 x16' Axelson, m.d., taper 24 x18' Lodge & Shipley, taper 26 x16' Bradford, taper 25 x18' Bridgetord, taper 27 x21'9' Bridgetord, m.d., taper CONE HEAD ENGINE LATHES 14"z6" Bradford, collet attach. 16"z6" Bradford 15"z6" Willard 16"x8' Bradford 16"x8" Cincinnati 18"x6" Bradford 18"x8" Mueller, t

'x10' Springfield 'x12' Barker 18"x12" Monarch 18"x14" LeBlond, taper 19"x8' LeBlond, taper 19"x12' LeBlond, taper 19"x12" LeBlond, taper 20"x10" Davis 20"x10" Lodge & Shipl

& Shipley 21"x8' LeBlond, taper 21"x10' LeBlond 21"x16' LeBlond, taper "x12' Greaves-Klusman xl3' Niles

22 x13 Nnes 24"x10" Bridgeford 24"x10" Canada 24"x10" LeBlond 24"x10" Whitcomb-Blaisdell 24"x11" Chard

24 x11' Chard 24-48'x16' McCabe 2 in 1 24"x16' Schumacher-Boye 24"x26' American, taper 26"x18' Schumacher-Boye, 27" raised to swing 38'x16'

27" raised to swing 38"x16" American, tap. 30"x20" Schumacher-Boye 6"x10" Schumacher-Boye 6"x10" Schumacher-Boye 80"x10" Schumacher-Boye

30" Colburn, 1 head 42" Gisholt, 2 heads 42" King, 2 heads 48" Niles-Bement-Pond Car Whl. Bor., belt 51" Baush, 2 heads

51" Boush, 2 heads 7 Niles, cone, friction type No. 2 Barrett Cylinder Borer, 5" bar No. 4 N-B-P Horizontal, md., 5½" bar Niles-Bement-Pond Cyl. Bor., 12" main bar

No. 2 Heavy Oesterlein Plain, cone 11"x4" Hanson-Whitney Thread, m.d. No. 2 Garvin Lincoln Type, cone No. 2 Garvin Lincoln 1796, cone Carter & Hakes Mfg., cone Gooley & Edlund Briggs Type, belt Newton C17 Vertical Slab, m.d. C66A Newton 3 spindle Continuous, s.p.d. Putnam Briggs Type, cone 30"x28"x8" Ingers. Pl. Type, 4 spindles 30"x28"x8" Ingers. Pl. Type, 40" Ohio Tilted Rotary, m.d. 48" Oesterlein Tilted Offset, n m.d.

GEAR MACHINERY No. 61, 62, 615, 645 Fellows 6", 18" Gleason Strt. Tooth Bevel Generat. Gleason Spiral Bevel Gear Rougher, s.p.d. 16" Cincinnati Hobber, m.d. 16" Gould & Eberhardt Gear Cutter No. 1 Lees-Bradner Gear Hobber, m.d. D. E. Whiton No. 1—28" Full Universal

D. E. Whiton No. 1—26" Full Or Spur & Bevel No. 3—26" Cincinnati Gear Cutter No. 3—26" Brown & Sharpe Spur No. 3—36" Brown & Sharpe Spur No. 4—36" Brown & Sharpe Spur No. 4—36" Brown & Sharpe Spur No. 4—46" Brown & Sharpe Spur No. 5A Lees-Bradner Gear Generator No. 6-60" Brown & Sharpe Spur No. 6-72" Brown & Sharpe Spur Gleason Bevel Gear Tester

Cross Gear Tooth Rounder
20" Rochester Gear Tooth Rounder
Schuchardt & Schutte 10" Gr. Tooth Rdr.
RADIAL DRILLS

21/2' Avey Sensitive 3' American Sensitive 3' Carlton Sensitive 31/2 Fosdick Plain, gear box 4' Cincinnati Bickford Plain, d.c. drive 4' Cincinnati Bickford Plain, gear box 4' Hammond Jack Knife Niles-Bement-Pond Semi-Univ., d.c. dr. Niles-Bement-Fond Semi-Univ., Semi-Prentice Picin, cone Ryerson Picin, gear box Bickford Picin, d.c. m.d. Dreses Picin, gear box 15" col., 6" N-B-P Semi-Universal, d.c. m.d., 6" N-B-P Semi-Universal, gear box

Prentice Plain, cone Dreses Plain, gear box Dreses Plain, gear box 7' Fosdick Plain, cone TURRET LATHES AND SCREW MACHINES

TURRET LATHES AND SCREW MACHINES
No. 0 Brown & Sharpe Hond, cone
No. 3 Foster, cone, Timken Bearings
No. 4 Bardons & Oliver, cone
No. 4 Foster, cone
No. 6 Brown & Sharpe Hand, cone
214x24" Jones & Lamson Steel hd., bar eq.
214x26" Jones & Lamson, bar
3x36" Jones & Lamson Stl. Hd., m.d., chkg.

PARTIAL LISTING ONLY.

## THE EASTERN

1001 TENNESSEE AVENUE.

## MACHINE TOOLS

3x36" Jones & Lamson, m.d. chucking 3x36" Jones & Lamson, m.d., bar 2 spdl. 3x36" Jones & Lamson, m.d., chkg. 34x40" Greeniee Flat Turret, cone, bar 16" Warner & Surgens Warner & Swasey, cone 18" Acme, cone

No. 4R Acme Universal, chucking 21", 24" Gisholt, chucking 26" Libby Type C, chucking

AUTOMATICS

" Model A Cleveland 11/4-11/4" Cleveland Model B 11/4" Hartford 4 spindle "4" Cleveland Cleveland Model A 2V2
Cleveland Model A
No. 5A, 6A Potter & Johnston Automatics
No. 6D Potter & Johnston Auto. for b.d.w.
No. 23, 24 New Britain Automatics

GRINDERS No. 70 Heald Internal, belt No. 6 Bryant Chucking, belt No. 1 Fraser Lapper, 25" plate No. 3 Brown & Sharpe Planer Type Surf. Covell-Hanchett Knife No. 500 UK 18x46" Diamond L.D. Face, m.d. 30x84" Diamond H.D. Face, m.d.

18x48" Diamond L.D. Face, m.d.
30x84" Diamond H.D. Face, m.d.
54" Bridgeport Knife
10x20" No. 1 Landis Universal, belt
12x48" No. 3 Modern Universal, belt
12x48" No. 14 Modern Universal, belt
10x50; 60, 65 Heald Cylinder, m.d.
No. 55, 60, 65 Heald Cylinder
6x32" Norton Plain Cylindrical, m.d.
No. 14-10x18" Brown & Sharpe Plain, belt
10x30" Queen City, m.d.
10x36" Landis Integral Cam, m.d.
10x36" Norton Plain, m.d.
10x48" No. 14 Brown & Sharpe Plain, belt
10x52" Landis Plain, m.d.
12x18" Cincinnati, Plunge Cut, m.d.
12x36" Cincinnati, belt
12x36" Cincinnati, belt
12x36" Cincinnati, m.d.
12x42" Landis, belt
12x48" Modern, m.d.
12x42" Cincinnati, 3 m.d., hydraulic
16x52" Landis, belt
16x52" Landis, m.d.
Modern Chapser Grinder, belt

19832 Lanus, m.a.
Modern Chaser Grinder, belt
No. 1 Cincinnati Universal Tool & Cutter
No. 4, 5, 31 Oliver Mtr. Dr. Drill Pointers
No. 23 Brown & Sharpe Gr. Cutter Grinder
Gisholt Universal Tool, belt Gleason Cutter, belt Gould & Eberhardt Gear Cutter, belt

Landis Chaser, belt HAMMERS

Pettengell Bumping, belt 60 lb. Bradley Rubber Cushioned Helve 80 lb. Bradley Rubber Cushioned Helve 100 lb. Little Giant, belt

SEND US YOUR INQUIRIES.

# MACHINERY CO.,

200 lb. Bradley Upright Strap, belt 350 lb. Niles-Bement-Pond Steam, new (3) 550 lb. Bement-Miles Steam 650 lb. American Eng. Steam

1500 lb. Morgan, steam 2000 lb. Erie Double Frame Steam 2000 lb. Niles Single Frame Steam

PLANERS 24" Cincinnati Crank, 1 head, m.d. 24" x24" x12" Chandler, 2 heads, belt 36" x36" x10" Cincinnati, 3 heads, belt 36" x36" x10" Whitcomb-Blaisdell, 2 hds. 36 x36 x16 whiteomic-biclisdell, 2 hds., bt. 36 x36 x13 N.-B.-P., 1 rail, 1 side hd., belt 42"x42"x16' Rockford, 4 hds., var. sp. m.d. 42"x42"x20' Ohio, 2 heads, m.d.

PRESSES McDonald Single Crank, 4" stroke Waterbury-Farrell S.C., weight 600 lbs. Waterbury-Farrell D.C., weight 1700 lbs. No. 2S Consolidated O.B.I. C2 Ferracute O.B.I. DD2 Ferracute Drawing P2 Ferracute Stiles No. 4 Consolidated O.B.I. No. 6 Waterbury-Farrell D.C. S51 Ferracute D.C. DG53 Ferracute Redrawing

No. 93A Toledo S.S. No. 26814B Toledo D.C. Toggle Drawing, weight 175,000 lbs. No. 496D Toledo D.C. Toggle Drawing, wt. 160,000 lbs.

300 ton Niles-Bement-Pond Wheel Press

SAWS No. 2B Cochran-Bly Cold Saw No. 4 Cochran-Bly No. 4B Cochran-Bly No. 15 Lea Simplex 6" Avey Milband Cutting-off 8" Newton 6x6" Region 6x6" Racine Hack Saw, m.d. 8x6" Racine, m.d. 10x10" Kelly m.d., new 10x10" Atkins, m.d. 20" Burke Cold Saw

WELDERS 200 cmp. Lincoln Stable Arc 300 cmp. General Electric 300 cmp. Lincoln 300 cmp. Hobart mounted on truck with Chrysler Engine

MULTIPLE SPINDLE DRILLS

2 spindle Textile Horizontal, m.d. in base
3 spindle 20" Barnes Gamq
4 spindle No. 2 Colburn Mfg.
4 spindle No. 2 Foote-Burt
4 spindle No. 4 Foote-Burt
5 spindle 24" Barnes All-Geared Self-Otl.

spindle National Acme Automatic Horiz. spindle 21" Hoefer Gang spindle Niles No. 4

CINCINNATI, OHIO

## .. IN STOCK

#### AUTOMATICS

No. 2 Brown & Sharpe No. 2G Brown & Sharpe No. 6A Potter & Johnston

#### BROACHES

No. 3 and No. 4 La Pointe

#### DRILLS

No. 2 Colburn S.S. 24" Barnes, Power feed 36" Barnes, Power feed No. 12 Natco Multiple Spindle No. 5 Fox Multiple Spindle Natco 3 way Horizontal multi, spdl.

### GEAR CUTTERS

15" Gleason Spiral Bevel 18" Gleason Gear Tester

#### GRINDERS—Cylindrical

No. 20 Bryant Chucking 16"x50" Norton Crankshaft No. 2 Brown & Sharpe Universal 18x96 Brown & Sharpe Plain No. 3 Cincinnati Centerless

#### GRINDERS-Rotary

No. 25 Heald-18" chuck

#### GRINDERS-Surface

No. 2 Diamond 22x84 Pratt & Whitney

#### LATHES

8x6" Rivett Precision, C.D. 14"x6' Monarch, C.D. 16"x6' Monarch, C.D. 20"x16' Monarch, C.D. 21"x8' LeBlond-C.D. 22"x14' Bradford, geared head 8x24" Sundstrand—S.P.D. 3½x60" Fitchburg Lo-Swing-G.H. 11"x5' LeBlond, G. H. Production
14"x6' LeBlond, C. D. Production
18"x7' Chard, C. D. Production

No. 4 Atkins Band—M.D.
16" Higley Cold Cut
No. 6 Nutter & Barnes

#### LATHES-Turret

No. 6 Warner & Swasey-C.C. No. 2A Warner & Swasey No. 3A Warner & Swasey No. 1B Foster No. 5 Foster No. 41/2 Bardons & Oliver No. 7 Bardons & Oliver No. 9 Bardons & Oliver No. 10 Bardons & Oliver 2¼"x24" Jones & Lamson 3"x36" Jones & Lamson 26" Libby

#### MILLS-Boring

No. 3 Universal-Horizontal 42" Bullard Vertical

#### MILLS-Plain

No. 2B Brown & Sharpe S.P.D. No. 3 Cincinnati-S.P.D. No. 3S Cincinnati, Rect. Overarm No. 21 Brown & Sharpe-S.P.D. 18" Cincinnati-S.P.D.

#### MILLS-Vertical

No. 4B Becker-C.D. No. 5B Becker, C.D. No. A. B. Becker-S.P.D.

#### OIL GROOVER

Wicaco Continuous

#### PLANERS

30x30x8' Cincinnati 60"x60"x11' Pond

#### PROFILERS

No. 13 Pratt & Whitney

### ROLL FORMING MACHINE

Hamilton-8 stand

## Indianapolis Machinery & Supply Co., Inc. 1959 SOUTH MERIDIAN STREET, INDIANAPOLIS, INDIANA

#### AUTOMATICS

2¼" Gridley Single Spindle 3¼" Gridley Single Spindle 4¼" Gridley Single Spindle

#### BORING MACHINES

No. 2-3%" Bar Rockford No. 1 Barrett, 3¾" Bar No. 2 Barrett, 5" bar

#### BORING MILLS

30" Bullard, 1-turret head 36" Bullard, with side head 42" Bullard 72" Bickford.

#### DRILLS

I. 2, 4 Spdl. Leland-Gifford, Motor Spindles, Power Feed
1, 2, 4 Spdl. Henry & Wright.
4 spdl. Demco. Power Feed
No. 2—6 spdl. Leland
No. 2 Colburn, I Spindle
No. 4—5 spdl. Foote-Burt.
No. 1 Baush Multiple
No. 3 Baush Multiple
So Western Heavy Plain No. 3 Baush Muniped 5' Western Heavy Plain

#### GEAR CUTTERS

No. 2 Bilton No. 12 Barber-Colman Hobber. No. 1/2, Pfauter Hobber. No. 3-26" Brown & Sharp No. 3-26" Brown & Sharpe.
No. 4-36" Brown & Sharpe.
No. 4-48" Brown & Sharpe.
No. 5-48" Brown & Sharpe.
No. 6-72" Brown & Sharpe. No. 6-A-72" Cincinnati 96" Newton Spur Gear 6-A-72" Cincinnati. Nos. 6, 61, 62 Fellows No. 36BM G. & E. Rougher 18" Gleason Bevel Generator

#### GRINDERS

(See page 312-special advertisement) Hill-Clarke Culindrical Grinders

No. 70 Heald Internal 16"x32" Landis Crankshaft
No. 2½ Universal (Bath Type)
No. 4:12"x56" Landis Universal.
No. 5 Springfield Planer Surface
No. 2—18" Gardner Disc

#### MFG. LATHES

3½"x36" Fitchburg Lo-Swing. 3½"x60" Fitchburg Lo-Swing. 3½"x108" Fitchburg Lo-Swing. 8"x60" Fitchburg Lo-Swing. No. 4AC LeBlond Auto. Crank

#### ENGINE LATHES

18"x6' Bradford 18"x8' Lodge & Shipley

21"x8' LeBlond Universal Turret 21"x10' LeBlond 24'x22' Lodge & Shipley, Taper Attach. 26"x8' Bridgeford 36"x10' Bridgeford 30"x12' Whitcomb-Blaisdell 20"40"x10' Rahn - Latmon Geared Head Sliding Bed Gap.
"New Haven Triple Geared

#### MILLERS

No. 3 Becker-Brainard Plain. 5" Pratt & Whitney Automatic Type "B" Briggs Mfg. No. 33—36" Kempsmith Production No. 4 Garvin Profiler No. 4 Garvin Profiler 24"x24"x12" Ingersoll Adj. Rail. 24"x20" Ingersoll Double Faced 36"x36"x12" Newton Duplex. 38"x44"x20" Ingersoll Slab. 72"x16"x14" Ingersoll Slab. No. 1 Smalley-General Thread. No. 4 Lees-Bradner Thread.

#### PLANERS

PLANERS

24"x24"x8' Powell.

24"x24"x12' Gray.

30"x8' Newell.

30"x30"x8' Newell.

36"x36"x12' American.

36"x36"x12' American, 1 Hd.

36"x36"x12' American 2 hds.

42"x42"x14' Gray, 2 heads.

48"x48"x10' Niles-Bement-Pond, 2 heads.

48"x48"x12' Gray, Reversing M.D.

#### PRESSES

No. 303 Bliss S.S., Geared. No. 58 Toledo Nosing. No. 42½ Pels Beam Shear Type C Cleveland Punch & Shear

#### TURRET LATHES

21/4"x26" Greenlee 31/4"x40" Greenlee 3"x36" J. & L. 2 3"x36" J. & L. 2 spdl. 18" Libby, 3 9/16" H.S. 21"x8' LeBlond Universal 21" Gisholt, 334" H.S. 24" Steinle, 614" H.S.

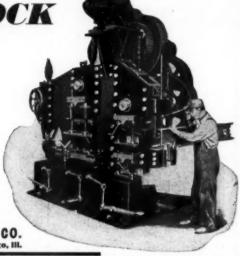
#### MISCELLANEOUS

15" Hendey Shaper 26" Springfield Shaper 26" Springfield Snaper
24" Mark Flather Shaper
No. 3-B J. N. La Pointe Broach
No. 4 J. N. La Pointe Broach
8" Landis Pipe Machine
12" Bignall & Keeler Pipe Mach.
60" Ouickwork Rotary Shear
Burr Keyseater, 72" Feed Burr Keyseater, 72" Feed 616' Avey Metal Bandsaw

## LL-CLARKE MACHINERY CO 645 W. WASHINGTON BOULEVARD, CHICAGO

IN STOCK

NO. 7 RYERSON STEEL FRAME HIGH POWER **OUINTUPLE** COMBINATION PUNCHING AND SHEARING MACHINE, ARRANGED FOR MOTOR DRIVE WITH MOTOR.



LAKE MACHINERY CO. 652 W. Lake St., Chicago, Ill.

## OTT MACHINERY SPECIALS

AUTOMATICS:

Cleveland, Model M, 4½" Chucker, M.D. Cleveland, Model B, % 6 1¼" Cleveland, Model A, 1¼ 6 2" New Britain, No. 22 Gridley, Model F, 4 spindle, 11/4"

Automatic Threading Lathes, 13"x6' G.H.

BORING MILLS, 54" Niles, 2 Swivel Heads 42" Bullard, 2 Swivel Heads

DRILLS, Edlund, No. 1A, 4 spdl. P.f. No. 3 M.t. M.D. Baush & Natco Multiple spindles Fosdick, 3½' Radial Henry & Wright, 1 to 8 Spdl., No. 2 mt.

GEAR CUTTERS, Fellows No. 61 Shaper

GEAR HOBBERS, Barber-Colman No. 12

GRINDERS, B. & S. No. 3 Universal Heald No. 65 Cylinder Landis, 16x66" Plain Norton, 16x36" Crankshaft

Norton, 6x32, 10x18 & 24" Plain Cincinnati Face Mill. Excello M.D. spdle.

LAPPERS, No. 15 Norton, M.D.

LATHES, Hendey, 12"x8, & 14"x5 National, 18x8" Cone, Q.C. Schumacher & Boye, 24"x10" Cone, Q.C. Acme Turret 31/4x36" M.D.

MILLS, Becker, Vertical, 30" Rotary Table Briggs Type A & B Mfg.

PRESSES, No. 94 Bliss, Solid Back
No. 68N Bliss Double Action
No. P 3 64, PG 2 6 5 Fer., Solid Back
No. 74 6 75 Toledo Open Back
No. 44P Toledo Horning, M.D.
Cleveland No. 152D, Dble. Crank, 30x75"
Bed, Tie Rod, Sgle. Geared, 4" Shaft,
4" Stroke, M.D.

PROFILERS, P. & W. No. 13 Single Spindle

TAPPERS, No. 1, 2 & 2X Garvin 6 Spdl. Holmes Tilted No. 3

OTT MACHINERY SALES, Inc. 548 Second Ave., DETROIT, MICHIGAN

## AT A GREAT SAVING OFFER MMEDIATE DELIVE

MOST MODERN LARGE PRESS

EVER OFFERED ON THE USED MARKET

CLEARING CRANKLESS SUSPENSION TYPE TRIPLE ACTION

- . Bed 84'x133'
- All Steel Construction
- Self-Contained
- Motor Drive
- All Gears Enclosed Running in Oil
- All Drives and Ram Adjustments Operated from One Control Board



#### CAN BE SEEN IN OPERATION

ANGLE IRON SHEARS: Ovington \$xxia\*, dbie. end. Peis Argie & Beom Shear, \$xxx; duTOMATIC SCREW MACHINES: No. 1, 2, 3 Manville; No. 00 848; 2" Model B Cleve. BORING MILLS: Horiz: 12" Miles Oyl. Boring Machine. double end; 24" Cleveland, No. 0 G & L well of the control of the co

MILLS: Planer Type; Ingersolf, 30x144", 2
heads: 4 head, 14' bed, 6'r spindle.
heads: 6'r collisions: 16's collis

Vertical
PAP BALER: Galland & Henning Hydraulin: 60"x24"x18", with 30 H.P. motor,
hopper, compressor, pump and tank SCRAP

INTERST



1449 WEST PERSHING ROAD

PHONE

CHICAGO, ILLINOIS

## VICTOR'S BARGAINS IN Tungsten Carbide Tipped Tools

Price \$1.00 Each In Any Size

New Low Prices. - Increase Production - Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.



Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

SEND FOR OUR CIRCULARS

Victor Machinery Exchange, Inc.

**251 CENTRE STREET** 

NEW YORK, N. Y.

## DIAMOND POINT EMERY WHEEL DRESSERS



A very efficient tool for dressing Emery Wheels.

Diamonds are mounted in 7/16<sup>8</sup> diameter rods 6<sup>8</sup> long.

1/4 KT. FOR USE ON 6' DIA. WHEELS OR SMALLER \$3.00 each net

1/2 KT. FOR USE ON 8' DIA. WHEELS OR SMALLER
\$4.50 each net

34 KT. FOR USE ON 10' DIA. WHEELS OR SMALLER \$7.50 each net

1 KT. FOR USE ON 12" DIA. WHEELS OR SMALLER
\$10.00 each net

1½ KT. FOR USE ON 24' DIA. WHEELS OR SMALLER \$15.00 each net

\$ KT. FOR USE ON 30° DIA. WHEELS OR SMALLER \$20.00 each net

MOUNTED FREE IN ANY DESIRED HOLDER

SEND FOR OUR CIRCULARS

VICTOR MACHINERY EXCHANGE, INC. 251 Centre St., • New York City

### **VICTOR'S BARGAINS IN NEW**

## Carbon, High Speed & Tungsten Carbide Tipped Lathe Centers



#### THESE CENTERS ARE GROUND AND HARDENED

Whole Length	Net Prices	Net Prices	Net Prices Tungsten Curbide Tipped
3 5/16 4 3/16	\$ .54 each .65 each	\$1.55 each 2.25 each	\$3.00 each
5 1/4 6 3/4	1.50 each	3.25 each 4.25 each	8.00 each 12.00 each 18.00 each
	3 5/16 4 3/16	Carbon 3 5/16 \$.54 each 4 3/16 .65 each 5 1/4 1.10 each	3 5/16 \$ .34 each \$1.55 each 4 3/16 .65 each 2.25 each 5 1/4 1.10 each 3.25 each



#### NEW DRILL SLEEVES

WITH MORSE TAPER SHANK

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1-3	No.	1	hole	and	No.	3	Shank	 		 	 	 	 	 	 	 	 		.60		ach
2.3	No.	2	hole	and	No.	3	Shank	 -	-	 -	 -	 		 -	 	 	 		80	1 4	ach
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3-4	No.	3	hole	and	No.	4	Shank	 		 	 	 	 	 	 	 	 		.75		ach
2-5	No.	2	hole	and	No.	5	Shank	 		 	 	 	 	 	 	 	 		2.00		ach
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4-5	No.	4	hole	and	No.		Shank	 		 	 	 	 	 	 	 	 		7.00		ach
5-6	No.	5	hole	and	No.		Shank	 		 	 	 	 	 	 	 	 		7.00		ach

#### NEW

#### SLEEVES WITH BROWN & SHARPE TAPER

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## VICTOR MACHINERY EXCHANGE, Inc.

251 CENTRE STREET

**NEW YORK CITY** 

SEND FOR OUR CIRCULARS

# Good Used Machinery

ARC WELDER—G. E. 200 cmp., m.d.

BORING LATHE—Springfield 14"x10' bed
7" hole

BORING MILLS—Baush 44" m.d. Bullard 51" Vert., 2 hds., Bullard 42" Mill, vert.; Rockf. No. 2 horis., 34" Bar; Colburn 42" Vert. 2 Hds.; Colburn 42" one head; Mach. Tool 3" Horiz.

BRAKES D. & K., 5' Box & Pan, 14 ga. Keene 10' 16 ga. Toggle Press.

CUT-OFF MACHINE-Davis 6" cap.

DRILLS (RADIAL)—Fosdick4', Carlton 4' all gear box dir.; Hammond 4' sensitive; Bickford 6' gr. box; Mueller 4½' g. box; Morris 3' Gr. Box

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Sipp 1 & 2 sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Gif. 1-sp.; Avey 2-sp.

DRILLS (MISC.)—Defiance Hvy Duty 2" cap.; Hamilton 42" S. H.; Barnes 20" & 24" 1-sp. & 20" 4-sp.; P W No. 12 Multi-Sp.; Natco 20 sp. Rect. head; P. & W. 24 sp. rectangular head Adj.; Barnes 4-Sp. 24" Camelback

GEAR CUTTERS—B & S 28" s. p. d. cutomatic spur; Cincinnati 36" gear cutter. B. & S. 48"x10"; G. & E. 48" gear Cutter

GRINDERS—P & W 12" vert. surf.; Cin. No. 2 & B. & S. No. 12 univ. tool, B & S Nos. 116 pl.; B & S No. 2 and Abrasive No. 33 Surf. Heald Nos. 60 & 65 Int.; Landis 10x30" Plain; B & S 10x48"; Badger No. 220, auto. d. e., opposed disc (4); Diamond No. 2 Auto. Surf.; Ott. 5"x18"; Landis No. 3 Univ.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Kane & Roach 70 lb.; Beaudry 150 lb.; Beaudry 200 lb. Upright Helve

KEYSEATERS Mitts & Merrill No. 5 vert. Davis No. 1; M. & M. No.0; M. & M. No. 2.

LATHES Monarch 16"x10" M.D.; Lehmann 18'x9'; Americam 34"x18' Q.C.G. M.D. Hvy; Amer. 22x8'; Davis 22"x10'; L. 6 S 20'x10'; S.B. 6 E 20"x10' q. c. g; Flather 22"x10'; LeBlond 16'x8'; Gleason 45"x12"; Monarch 16"x8" (2); Ryerson 20x10', m.d.; S.B.E. 30"x112" Q.C.G. Hendey 16"x8" C.H.; Hendey 16"x10' grd. hd.; Sidney 18"x8' and Flather 16"x8'. L. & S. 16"x8' M.D.; S. Bend 16"x8'

MILLING MACHINES—Ohio No. 29, Ohio
No. 20, Hendey No. 3, B & SNo. 3, LeBlond No. 3H, Cin. No. 1 s.p.d. Platin;
LeBlond No. 4 M.D. C.D. & Cleveland;
No. 2, s.p.d. Platin; Owen Duplex; Ingersoll M.D. Slab Miller 4 hds.; Newton
Vert. with rotary table; Becker No. 2
Vert.; Ohio No. 24 Platin; Rockford No.
0 Platin

THREAD MILLERS—Smalley General No. 23-A; Moline No. 10

PLANERS—Pond 32"x34"x10"; Sellers 36x 36x12"; Pease 26"x26"x9"; Pond 54"x54" x12" 4 hds.

PIPE MACH .- Williams 6" cap.

PUNCH PRESSES — Ferracute No. P-4; Barouth No. 3 & No. 4 O.B.I.; Bliss No. 62; Toledo No. 31 & No. 32; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch; Cons. No. 24 Blanking

SAWS (HACK)—Atkins 8x8"; Racine 6x6" SAWS (COLD)—Cochrane & Bly Nos. 2-B & 4-B; Higley No. 14

3HAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Ohio & G & E 20"; S & M, Q. City, Rock., Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; American 24" heavy, b.g. Amer. 15"; Springf. 15"; S.&M. 26", b.g. & E 24", s.p., gearbox; Amer. 20"; Rockf. 24" gearbox

SCREW MACHINES—8 Hand; B.&S. No. 4 Hand; Gridley 4-sp. ¾"; W & S No. 2 SQUARE SHEAR—D & K 10' 3/16" cap. Ohl B' 14-ga.

SLOTTER—Barr 12"; Betts 6" stroke TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Baush 30" M.D.; Potter & Johnston, 8½x16 No. 10; Libby 24", m.d.; P. & W. 2½" hole grd. hd.; Greenlee 2½x26; Brown & Sharpe No. 4

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6"x32"	10"x72"	16"x50"
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10"x24" 10"x36"	14"x50"	18"-24"x96"
10"x50"	14"×72"	18"x96"

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BAKER No. 310 Mig. Drill
BARNES 22", 4 spindle all geared Drill
WESTERN 6' and 7' Plain Radial Drills
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BLISS No. 73½ Straight Side Press
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CLEVELAND %", ½", %", "", "1¼", 2½",
2-¾" Model "A" Auto. Screw Machines
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ESPEN LUCAS No. 138 Cold Saw—Cap.
12" Rd.
NEWTON No. 200 Cold Saw—Cap. 11" rd.

NEWTON No. 200 Cold Saw—Cap. 11" rd CLEVELAND No. 1 Plate Planer AMERICAN 36"x36"x20" Planer—4 heads ACME 1" All Steel Upsetter AJAX 3" All Steel Upsetter

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15"x8' Cisco, Cone Drive, Quick Chg. 18"x8' Greaves Klusman Geared Head, Quick Change. 18"x8' Monarch Grd. Hd., A.C., M.D.,

Q.C. 20"x10' Hendey Cone Q.C.

20"x10' Bradford, Cone Drive, Quick Change.

24"x10' Bradford, Cone Drive, Quick Change.

24"x12' American Grd. Hd., A.C., M. D., Q.C.

21"x10' LeBlond, 3 S.C.D. D. B. G. 26"x48"x22' McCabe Double Spindle Lathe.

30"x14' Lodge & Shipley, Cone dr., quick change.

30"x16' Lodge & Shipley Cone Q.C. 36"x12' Lodge & Shipley, Cone dr., Trip. Grd. Q.C.

Trip. Grd. Q.C. 36"x16' Boye & Emmes Trip. Grd., Q.C.

20"x8' Lodge & Shipley Pat. Hd. Q.C. 14"x6' Vernon, Cone drive, Q.C. 24"x10' American, 3 S.C.D. D.B.G. Q.C.

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16, 20, 24" G & E Shapers, cone dr. 16, 20, 24 and 28" Gould & E. Shapers, S.P.D.

20" Cincinnati Shaper, Cone drive. 21" Smith & Mills Shaper, Cone dr. 30"x30"x10' Cincinnati Planer, B.D. 60"x60"x12' Pond H.D., 3 Hds.

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2½' Cincinnati Bickford Upright Radial Drill.

4' Dreses Universal, S.P.D.

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D.B.G.

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4 Spdle. New Britain Chuck. Mach. Pierce 1" capacity Bar feed & mtrzd. 5A Potter & Johnson

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1½" Hayden 4 spindle Automatic Screw Machine. 2½" Landis Bolt Cutter.

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No. 4A High Speed Riveter New.
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No. 36 Niagara Presses New.

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8" Atkins Saw. 6"x6" Peerless Sha

6"x6" Peerless Shaping Saw. 35 K. W. Federal Spot Welder. 3" Landis Bolt Cutter, Cone drive.

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Baush 37.—2 Head

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1-30"x36"x20' Whitcomb Planer, 2 hds. on cross rail, m.d.

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# **Machine Tools**

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- Prentice Lathe, 12 x 5', single pulley drive, taper attachment, apron control
- LeBlond Heavy Duty Lathe, 24" x 16', cone drive
- 2—Monarch Production Lathes. 16" x 30" between centers, front and rear carriages
- 2—Prentice Turret Lathes, 18" single pulley drive
- Morris radial drill, 3' single pulley drive
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- Heald Internal Grinder, #75, complete
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24\*x12' Schum. Bove q. c. g. 24\*x10' L. & S. Q. C. G, B. G. 8\*x18\* Porter Cable, collets.

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Surface, No. 1 Le Salle.
Universal, 10x30 Thompson
Wet tool, Springfield, 27" wheel

Cold, Higley, 20" saw, No. 17

26"x14" Niles, PCG 22"x10" Whitcomb-Blaisdell 22"x10" Whitcomb-Blaisdell 20"x8" Eblond QCG, DBG 20"x8" Bradford, PCG MD, 18"x8" Hahn & Mayer PCf 16"x8" Fay & Scott QCG 14"x6" Monarch QCG, 14"x6" Rumsey, PCG "x42" Atlas, bench type, H-42, 1/3 HP, 110 V n

### LATHES-Turret:

2x24" Jones & Lamson 12" Reed-Prentice BG

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Cam Drawing, 69-N Bliss
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OB.I. Wold, 13.50 lbs.
Punch. No. 5 Bliss Stiles
No. 20 Excelsior 4" in 4" 4 Swaine

PUNCHES & SHEARS: SE, Cleveland C \(\frac{1}{2}\) in \(\frac{1}{2}''\), 26" thr. SE W-W 14\(\frac{1}{2}\), 25" thr. 1 in \(\frac{1}{2}\) in \(\frac{1}{2}''\), DE 1-10 Badger \(\frac{1}{2}\) in \(\frac{1}{2}''\), 10" thr.

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Cold, Higley, 18" saw, No. 14 Hack, No. 3 Robertson 6x6" Hack, No. 14 Atkins 6x6"

16" Davis, sgl. pulley drive 16" Milwaukee B.G. 20" Smith & Mills 26" Hendy planer type dr.

SHEARS:
Dbl. action, No. 11 Excelsior, inside cutting, cap. 10 ga.
Rotary Bevel. Lennox i''
Slitting, Niagara, cap. i''
Square, 38'' Bertsch. power
Throatless, 18 H Marshalltown

## THREADERS, Pipe & Bolt: Murchey, 1" dbl. head, bol Pipe, 2" Oster No. 302 Pipe, 4" 2-A Williams

Pipe, 4" 2-A Williams

##SCELLANEOUS:
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14x9x8", 6" tank, 20 HP mtr.
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Jacks, Lever Lift, 15 ton J. O.
Miller, U. S. Hand
Planer, 30",330"x8" Wheeler
Roll, Corrugating, 10" Robinson
Serve Mach, No. 2 J. & L.
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Dyer spot
Vaive Refacer, 4" Black & Decker

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14 Cleveland Model A
No. 24 New Britain chucking
No. 33 New Britain chucking
No. 34 New Britain chucking
No. 6A Potter & Johnston

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3' Cincinna. Western cinnati 4' Hammond, sensitive 5' Western 13" column, full American, 13" column universal, motor on arm American, 14" column

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x32" Norton 10"x20" Bath 10"x24" Landis 10"x36" B No. 1 universal Landis Bath No. 24 universal 10"x36" 10"x36" 10"x50" 10"x52" Norton Norton Landis
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12"x36" Landis sell contained 12"x72" Landis 4"x50" Norton 4"x72" Norton 6"x42" Landis No. 3 universal 1"x36" -48" Norton hydraulic crk. pin grdr., type B, Mod. 84

#### ENGINE LATHES

14"x8' LeBlond 14"x8' Lodge & Shipley 14"x8' Monarch 16"x8' America 14"x6' Monarch 14"x6' LeBlond 14"x8' Lodge & 14"x8' Monarch 10°x9' Monarch
16°x8' American
18°x6' Rahn Larmon
18°x6' Rahn Larmon
18°x8' Sidney
20°x10' American
20°x10' American
20°x10' X-Merican
20°x10' X-Merican
20°x10' X-Merican
20°x10' X-Merican
21°x10' LeBiond hear at L 24"x10' LeBlond heavy duty, dbl. back gears, taper att. 24"x10' Hendey stand. chgc gr. 24"x10' New Haven 24"x12' Lodge & Shipley 24"x14' Schumacher & Boye 24"x14' Schumacher & Boye dbl. back gears, taper att. 36"x2' S. & B., triple geared 42"x18' New Haven

TURRET LATHES

Most of these can be supplied either with bar feed and auto-matic chuck or arranged for chucking work. 14" (17" swing) No. 4 Foster, power cross feed

21"x20 2"x36"

174" swing No. 4 Cincin. Acme 18" which 18" swing 18" cross feeding headstock 24" 226" Acme 3".336" (144" swing) Jones & Lamson, cross feed. headstock 20" swing Jones & Lamson 2-spindle, cross feed. headstock 20" swing Jones & Lamson 2-spindle, cross feed. headstock 20" swing No. 6 Foster, 3" hole crank, double geared toggie crank, approximately spill power cross feed. headstock 20" swing No. 6 Foster, 3" hole crank, approximately spill power cross feed headstock 20" swing Jones 4 "Leffer double crank, single geared, 2" and 18" swing No. 6 Foster, power cross feed headstock 2" (21" swing) No. 5 Foster, power cross feed headstock 2" (21" swing) No. 6 Foster, 3" hole feed to the complete of the complete 2½"226" Acme
3"336" (14½" swing) Jones &
Lamson, cross feed, headstock
10" swing Jones & Lamson 2,
25" swing No. 6 Foster, 3" hole
24" 20½" swing No. 6 W. 48. 8,
24" (2½" swing) No. 6 W. 48.
24" (2½" swing) No. 6 Toster,
25" & 24" (3isholt
No. 6 & Potter & Johnston
24" Bullard rapid prod. vertical

#### PRODUCTION LATHES

9" Sundstrand Mfg. 9" No. 9 LeBlond, geared head multicut 13"x6" Auto. thread, gear head 16"x5' Monarch Mfg. or rapid or rapid production production
16"x10" LeBlond rapid product.
17"x6" and 17"x8' LeBlond Mig.,
geared head
18"x7'.6" Wickes geared head,

18"X7-0" WICKES garred nead, rapid production 18" Gisholt Simplimatics 20"x8"6" Wickers grd. bd. mfg. Melling 4 cylinder camshaft lathe Melling 6 cylinder crkshaft lathe Wickes center drive crkshaft lathe

#### PRESSES

No. 3 Robinson OBI, 21" stroke 71 ton Waterbury Farrei OBI, 4" stroke, 8300 lba. No. 76 Toledo, open back non-inclinable, geared, 3" stroke,

7500 lbs. 62 Bliss O.B. non-inclinable No. 62 Bliss O.B. non-inclinable Waterbury Farrel, open back non-inclinable, 14 strk, 3700 lbs. No. 30E Cleveland s., dbl. grd., twin dr., 14 stroke, 1300 ton capacity, 235,000 lbs. No. 4 Massilion ss, geared, 5 stroke, 9670 lbs. No. 65 Bliss consolidated, ss, grd., 3 stroke, 9000 lbs.

No. 65. RHss consolidated, ss. grd., 3" stroke, 9000 lbs.
No. 744 Blias ss. flywheel drive, 6" stroke, 8500 lbs.
No. 7 Rockford ss. geared, 34" stroke, 9000 lbs.
No. 8-7 Zeh & Hahnemann ss. geared, 24" stroke, 6000 lbs.
No. 554 Toledo ss. flywheel dr., 5" stroke, with side trimmer and with motor, 7750 lbs.
No. 554 Toledo ss. flywheel dr., 5" stroke, 7500 lbs.
No. 554 Toledo ss. flywheel dr., 5" stroke, 7500 lbs.
No. 554 Toledo ss. flywheel dr., geared to motor, 4" stroke, 8600 lbs.

geared 8600 1600 lbs. 57 S Toledo m.

Ibs. No. 1"

lbs. 0. 41A Toledo type, horning, 1" stroke, 2100 lbs. 0. P2 Ferracute, punching, 1" stroke, 2500 lbs. 0. 2 Standard Machinery Co., acrew press, 12" str., 5206 lbs. mco Bench Presses, 1" and 14"

Emco Bench Presses, 1" and 1¼" stroke, 300 lbs. 150 ton No. 661 Toledo knuckle joint coin. 3" strke. 8630 lbs. 450 ton No. EG 54 Ferraeute coining, 1¼" str. geared 150 ton Elmes, hyd tire press, 434" bet. upc., 32" day light 30 ton Atlas No. 76, dble. hous. power arbor or foreing 20 ton General Flexible Nos. 201 & 208

12 203 & 203
12 ton Fox No. 24 Superflex
8 ton General Flexible No. 83
3 ton Fox No. 6 Superflex
No. 3 Atlas arbo
No. 34 Greenerd
No. 2 Standard sew. type broach-

ing press
2 Watson Stillman hydraulie

shaft straightening Nos. 2, and straightening Springfield shaft straight.

Nos. 23, 5 & 9 Willia White buildozers Williams & Detroit 5 spdl. auto, horiz, drills Nos. 1 & 5A Lees Bradner gear

No. 500 Osterholm surface grdr. 14" Pratt & Whitney surf. grdr. No. 1 Sellers tool grinder No. 3 Barber Colman hob, grdr.

2 Schuchardt & Schutte No. hob grinder

No. 2 Heim centerless grinder 2½" No. 4 Mitts & Merrill keyst. No. 3 Becker vertical mill Burr keyseat miller

24"x24"x24" Cinc. shaper, plr. 3/16" No. 1 Gray sheet metal cutter & K. press brake

10'x10 ga. D. & K. press b. 6 spdl. No. 3 Holmes tapper No. 57 S Toledo m. 750 ton Baldwin S outh wark 6 spdl. No. 3 Holmes tapper triple action hydraulically oper- 1½", 2½" & 4" Ajax upsetter ated toggle drawing press. Be- tween uprights 11'-10½", shut

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- 21/2' American Radial Drill
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- 1 18" Gleason Bevel Gear Genera.
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I—No. 3 Brown & Sharpe univ. gr, carr. for 3 m.d. Grdg. dict. 12', grdg. length. 30". 2—12x36" Clinc. univ., carr. for 3 mtr. dr. 1—16"x80" Clinc. univ., carr. for 3 mtr. dr. -16"x80" Cinc. univ., arr. for 3 mtr. dr. -No. 14 B & S Plain cylindrical grinder, b.d., grind. dia. 10", grind. length 18"

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14'-20' N.B.P. 3 M.D. 100" Pond, Heavy, 2 hds. 84" Betts, Heavy, 77" swin 54" Bullard, P.R.T. 51" Bullard, P.R.T. 42" N.B.P. Car Wheel Borer swing

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3' Cinci. Bickford, S.P.D.
5' N.B.P. Univ. M.D.
5' N.B.P. Univ. M.D.
5' Western S.P.D.
6' Drewes Plain
4' Western S.P.D.
Nr. 13 P. & W. Multi
No. 13 Natco Multi.
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22 4" Superfor Upright
22 4" Sarnes Upright
24 Sarnes Upright
25 Barre M. Tapping
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14"x6' Monarch Q.C.G., Cone
14"x6' Monarch Q.C.G., Cone
16"x6' Pittnam, L.C.G.
16"x6' Sidney, Q.C.G.
16"x8' Hendey, Yoke Hd., T.A.
16"x8' South Bend, L.C.G.
17"x6' LeBlond, 3 cone
18"x12" LeBlond Grd. Hd.
20"x14' Monarch, Q.C.G.
22"x14' Amer. 4 cose
22"x14' All 2"L. & S., Q.C.G., M.D. 24"x10' Pittsbgh., Q.C.G., Cone

# LATHES (Continued)

24"x10' Amer. Grd. Hd. 24"x12' Putnam Grd. Hd. M.D. 24"x12' Rued Prentice Grd. Hd., T.A., Q.C.G. 24"x15' N.B.P. Q.C.G., T.A. 25"x12' Legion Gap. M.D. 25"x12' Logge & Shipley, M.D. 25"x16' N.B.P. Axel & Journal, Center Drive, M.D. 32"x18' Slifleld, triple grd. 33"x147"x16' Putnam, Cone. 36"x14' Rahn Larmon, Q.C.G., Cone. Tri. Grd.

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No. 4 Bardons & Oliver Fox
No. 5A Potter & Johnson (2)
No. 6 Brown & Sharpe, Serew
24" Gisholt, 64" H.S., 2 cone
24" Steinle M.D. 64" h.a., (4)
28" Steinle M.D. 84" h.a.
24"24" & 3'x36" & L.
3\(\frac{1}{2}\)x36" Cincl. Acme, M.D

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Automatics, 1" Clevel. Model A Automatics, 2-1" - 3-1" Clevel. Model A Sgl. Sp. (2 Sp. (2) Automatics, No. 5A Potter & Johnsons Chuckers (2) Billet Breaking Mach., Ajax Bolt Threader, 2" Landis Bolt Threader, 2" Natl. Chucking, No. 34 New Brit. Die Sinkers, No. 6 Jackson (3) Gear Cutters No. 3 & 4 Adams

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Hammer, No. 3B Nazel
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M.D.

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oil Groover, No. 1 Garrin
Pipe Machine, 8" Jarocki
Pipe Machine, 8" Jarocki
Pipe Machine, 12" Saunders
Pipe Mach., 12" Curtis & C.
Pipe Mach., 3" Storer M.D.
Pipe Mach., 2" Bignall Keeler
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Press, No. 44 Advance Cam Press, No. 58 Perkins S.S. Grd. Press, No. 44 Advance Cam Punch 54" H & J No. 2 D.E. Punch, 24" Pels, 14"x1" Punch, 20" Pels, 1"x3" Punch & S., No. 24, UX20 Buf. Punch & S., No. 91, Size 11 Smith

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60" Gould & Eberhardt, M.D.

72" Gould & Eberhardt, M.D., (2)

No. 12 Barber-Colman Hobbers Nos. 3, 6, 62 Fellows Gear Shapers

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60" Garvin Duplex Miller

24" Cincinnati Duplex Miller

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LATHES

LATHES

LATHES

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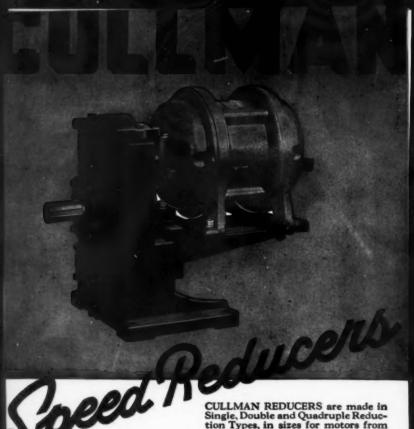
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